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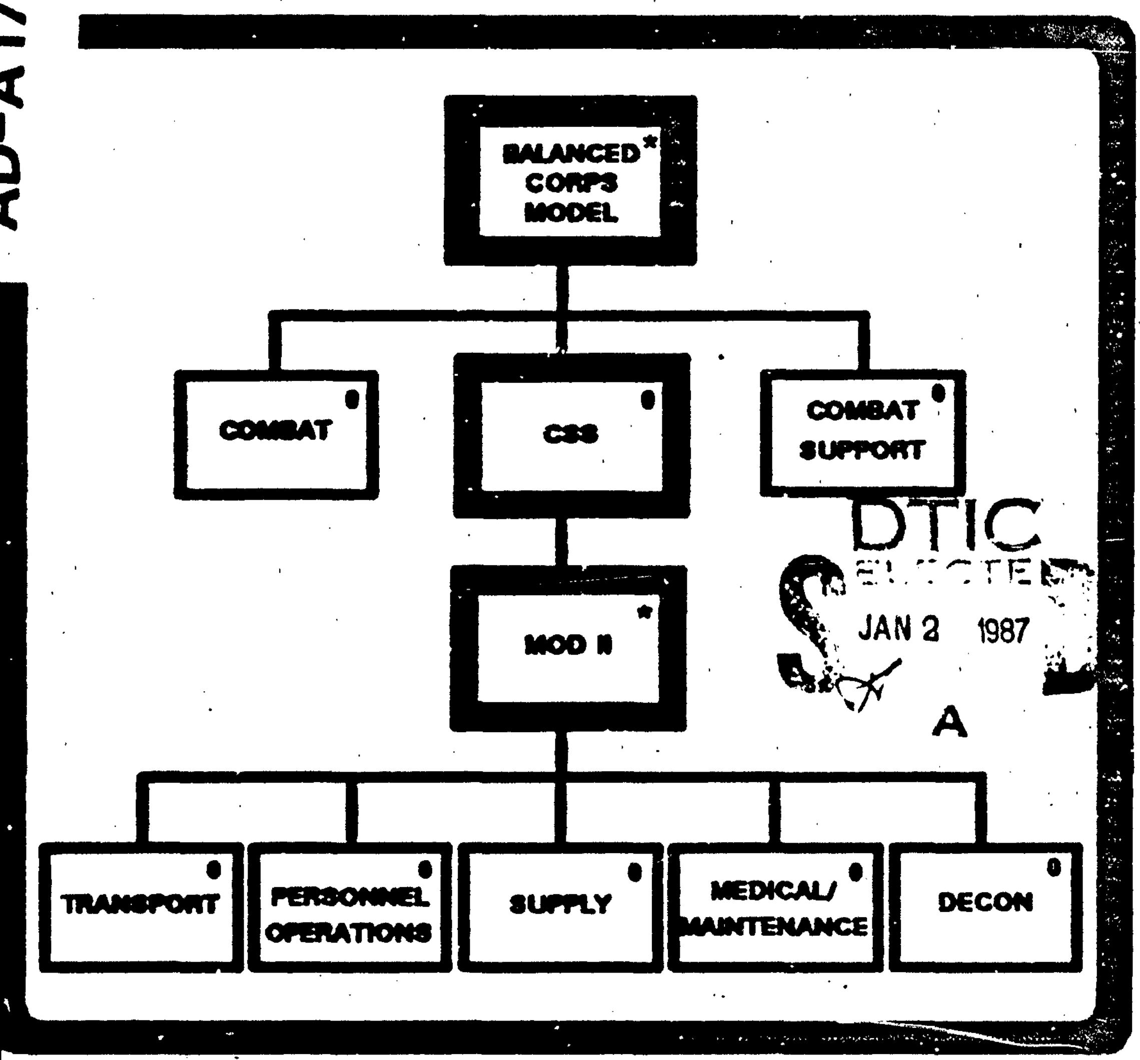
COMBAT SERVICE SUPPORT MOD II DESIGN

(CSS MOD II)

VOLUME II. APPENDIXES



MOD II DESIGN TEAM
Combined Arms Operation Research Activity (CAORA)
Logistics Center (LOGC)

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CSS MOD II is a multiphase project consisting of the development of Combat Service Support Representation Objectives (CSSRO); the design of a CSS module, based on the CSSRO, for use with a corps-division host model; and the implementation of the design. The design document contains background information of the project, descriptions of the CSS functional areas of concern (transportation, supply, personnel, medical, maintenance and decontamination), and the model design.

The document is separated into two volumes. Volume I contains the main report. Presented in the main report are discussions of the functional areas, each including the objectives, constraints and assumptions concerning the specified functional area; a description of the real world process being modeled; and a narrative of the design. Volume II contains the appendixes to the report. Appendix A contains a discussion of JSD, the design methodology used. Detailed design specifications for each functional area, host

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COMBAT SERVICE SUPPORT MOD II DESIGN
(CSS MOD II)
Volume II. Appendixes

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DISCLAIMER

The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

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The MOD II project was initiated and sponsored jointly by CAORA and LOGC.

The design team includes Mr. Ernest D. Boehner, team leader, Mr. Royce S. Hamlin, Ms. Susan D. Solick, and Ms. Louise C. Pudwill of CAORA, and Mr. Frank T. Lawrence of LOGC.

The assumptions and conclusions presented in this document are those of the design team. Those concerning CSS are based upon information provided by representatives of the schools and centers and gleaned from the pertinent FM series; those pertaining to design methodology are based upon information received through contractual agreement with Michael Jackson, Ltd, London. The spelling, syntax, and word usage adopted throughout the document have been made to conform to army standards.

The design team members wish to thank the following individuals for their assistance:

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This document is a product of the Combined Arms Operations Research Activity (CAORA) which recently became a part of the TRADOC Analysis Command (TRAC), Fort Leavenworth, Kansas. Hence, the approving signatures are of TRAC officials.

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ABSTRACT

CSS MOD II is a multiphase project consisting of the development of Combat Service Support Representation Objectives (CSSRO); the design of a CSS module, based on the CSSRO, for use with a corps-division host model; and the implementation of the design. The design document contains background information of the project, descriptions of the CSS functional areas of concern (transportation, supply, personnel, medical, maintenance and decontamination), and the model design.

The document is separated into two volumes. Volume I contains the main report. Presented in the main report are discussions of the functional areas, each including the objectives, constraints and assumptions concerning the specified functional area; a description of the real world process being modeled; and a narrative of the design. Volume II contains the appendixes to the report. Appendix A contains a discussion of JSD, the design methodology used. Detailed design specifications for each functional area, host model requirements, gamer interfaces, and data requirements are provided in the succeeding appendixes.

APPENDIX A

JSD OVERVIEW

1. Background. The Jackson System Development (JSD) and Jackson Structured Programming (JSP) methodology is a product of Michael Jackson Systems, Ltd., London, England. In 1984, Dr. Wilbur Payne, Director, TRADOC Operations Research Activity (TORA), selected JSD and JSP as the TORA model design standard. The MOD II design document represents both the first CAORA application of JSD to combat modeling and the first U S Army application of the methodology to a major simulation.

2. JSD Overview.

a. In JSD, the structure of a program is based upon the structure of the underlying problem. Components recognizable in and relevant to a problem can be mapped directly onto the components of the program. For example, a transportation problem primarily concerned with transporters, transporter suppliers, and transporter customers would generate a JSD transportation program structured around the same three entities. Any object recognizably important in the problem should have a corresponding program component. In other words, the entities (nouns), actions (verbs), attributes (adjectives and adverbs) and functions (processes) used in a simulation are selected and shaped by the reality being simulated.

b. The static relationships between the processes (i.e., the flow of the data into, between, and out from the entity-action and function sets) serve as the framework for the program text. The structure of the program is built by specifying the patterns of sequence, selection, and iteration components that define the possible paths of control. In JSD, the diagramming technique used to depict the program structure will contrast with traditional flow charting methods. Flow charts provide a description of program execution, but they have no direct affect upon the code; JSD structure diagrams are used to generate code during the implementation phase (see paragraph 4 below).

c. In JSD, development begins by constructing a model of the reality with which the simulation is concerned; identification of the functions needed will come later. There are several reasons for adopting this approach:

- The model expresses the user's view of the world and can provide a more satisfactory basis for communication with the user during the early stages of development.

- The model is more stable than are the user's functional requirements (i.e., functional requirements can change without the model itself changing; the model cannot change without requiring that the functional requirements change also).

- The act of constructing the model will implicitly define a set of possible functions; no function can be developed which does not rely on the model.

3. Definitions. Several terms used by the JSD process require elaboration:

a. Model. A JSD model is the formal description of the reality being simulated, given in terms of "entities" and "actions" to be portrayed. It consists of a set of disconnected processes (the entity-action sets) that describe the time-ordered behavior of the entities of interest. Because it preserves the sequential structure of the subject matter onto which functions are superimposed, the model is considered to be the fundamental structure of the system (i.e., the model processes are the domain of the functions).

b. Process. The real world objects being modeled are comprised of sequential processes (i.e., the events and actions that occur to an entity in some time-ordered sequence). In MOD II, the processes discussed generally refer to either the "life" of an entity (i.e., the entire entity-action set) or to a group of functions which together comprise a critical event in the life of an entity.

c. Entity. An entity is an object in the real world (e.g., a convoy, a supply base, a transportation request) which participates in a time-ordered set of actions and which needs to be tracked during the simulation. The entities selected should be those considered most important to the reality that is being modeled. If the user does not need or cannot gather the necessary information about an object, it should not be an entity in the model.

d. Action. An action is an event which results in changes to one or more entities. An action is the representation of an instant in time. It should not be be confused with a process which occurs over a period of time (e.g., BEGIN MOVE is an action; MOVE is a process). If an action cannot be measured in some manner within the model, it cannot be considered an action in the model. Actions and entities must not only be a part of the reality being modeled, but they must be examined closely to guarantee that they are appropriate for the level of resolution being modeled.

e. Attributes. An attribute is a data item which defines a characteristic of an entity, an action, or both. Entities are evaluated by monitoring their attributes. Entity attribute values can be changed only by the actions that occur in the program. In effect, an action is defined as an action because it results in a change-of-state to one or more entity attributes. Actions also have attributes. All data elements and variables, including the entity attributes, that are necessary for the performance of an action are considered attributes of that action.

f. State vector. In JSD, all of the elements needed to describe an entity within the model (i.e., all of the entity attributes that can be changed within the simulation) are held in a global structure called a state vector. Note that the value of an attribute in a state vector can only be changed as the result of an action.

g. Functions. A function is a set of instructions or steps performed in the model which results in the production of output (output function) or in the generation of one or more actions (interactive or generator functions). Output functions consist of simple algorithms which obtain data from the model and manipulate them to produce the required output information. Interactive functions apply sets of rules to the current situation to determine which action is to occur next. In other words, an interactive function generates the data which, when received by the associated entity-action set, will result in changes to the appropriate attributes. Most of the detailed, algorithmic work involved in the simulation will take place in the generator processes.

4. <u>Diagrams</u>. JSD diagrams are used directly during the implementation phase to produce code. Two types of diagrams are required: process structure diagrams and system specification diagrams (SSD).

a. Process structure diagrams. Process structure diagrams are used to define both entity-action and function sets. A process structure diagram is a tree structure composed of interaction, selection, and sequence components using the notation shown in figure A-1.

(1) Components. The top level component, the root, identifies the process (entity or function). Each node (box) below the root represents a component or step in the process. The relationship which exists between nodes is depicted by their relative location. Nodes are connected by branches. A node with one or more nodes branching down from it is called a parent node; the nodes branching directly from it are called its children, all nodes branching from it are called its descendents. Children of one parent node are called siblings. A parent and all of its descendents are called a subtree. A node which has no descendents is called the leaf node. The breakdown of a process into actions occurs only at the leaf-node level.

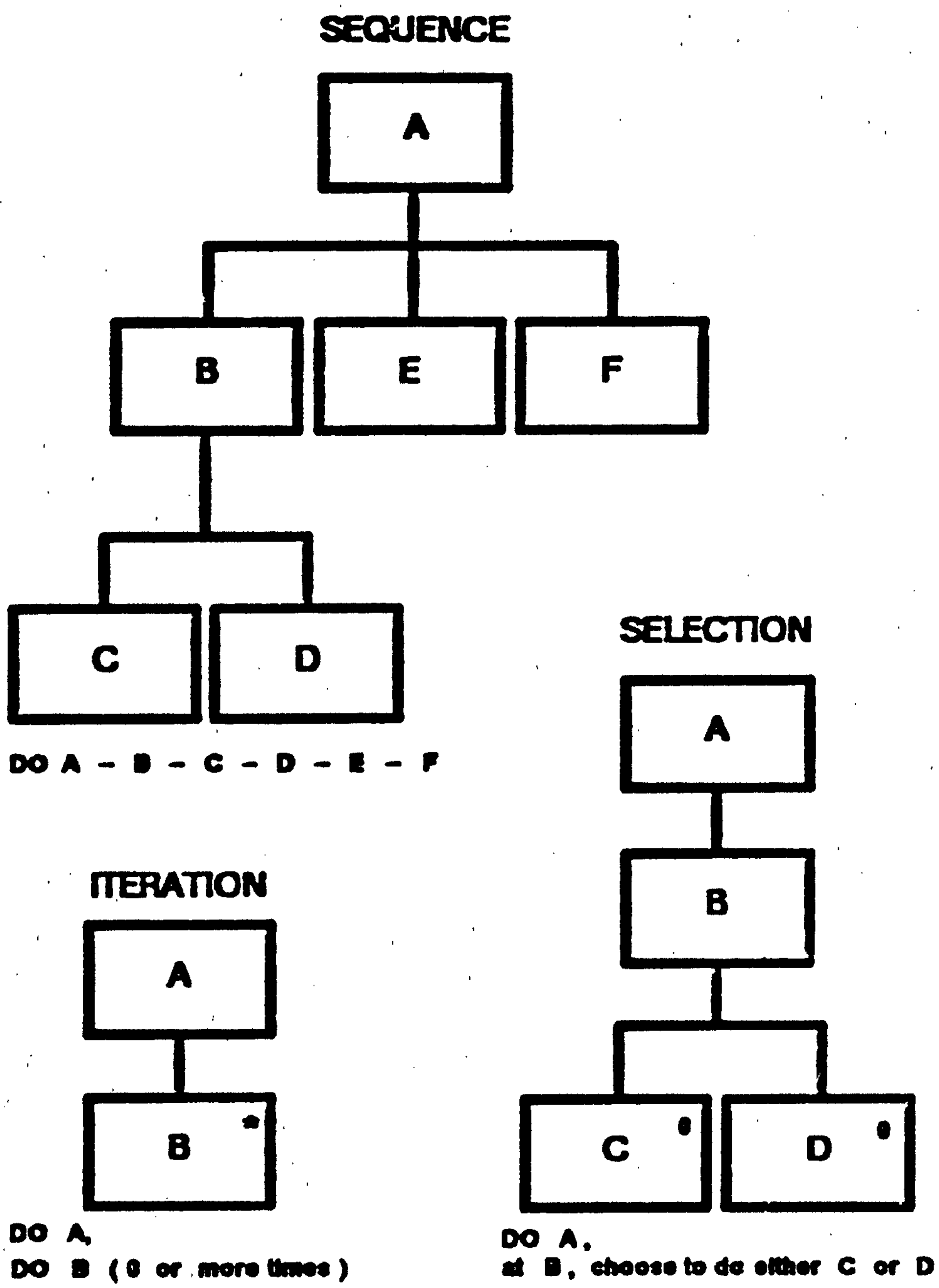

Figure A – 1. JSD structure diagram notation

(2) Sequencing. Function diagrams are read "sequentially" beginning at the root and following the leftmost branches down to the leaf-node level, locating the next most closely related node and following the branching to its leaf node, etc., until the final leaf node has been reached. Entity-action diagrams are read by locating the subtree structure containing the action to be performed and proceeding as described above until the final node in the action subtree has been reached. Sequential processing in this manner is assumed unless notation for iteration [*] or selection [*] appears in the upper right-hand corner of the box.

- Selection. Selection is required when only one of the siblings and its descendents will be processed at a time. The sibling nodes represent alternative steps in the process. A test made in the parent node determines which sibling to use; the remaining siblings and their descendents will be skipped. For example, if a parent node checks a unit's MOPP level and determines that it has been contaminated, the subtree in which the decontamination process is scheduled will be selected; if not, it would be skipped.

(3) Iteration. Iteration permits the iterated node and its descendents to be executed zero or more times. The number of repetitions of an iterated subtree can vary. The exact number required at a given time will either be determined by the parent node or will be obtained from data accessed by the iterated node itself.

In the MOD II design document, a structure narrative has been included with each structure diagram (see the functional area appendixes (C-G) for examples). In standard JSD applications, the narrative is not included in the design stage because structured text, a form of pseudo code, is generated during the implementation phase.

b. System specification diagrams (SSD). An SSD shows the data flow into and out of a designated function (i.e., the function's interprocess communication and data file requirements). Two basic types of communication are depicted: data stream and state vector check (see figure A-2).

(1) Data streams. Data streams are used when the process holding the data writes or passes the data to the receiving process. Both processes are aware of the transaction and the value of the variable can be changed during the transaction.

(2) State vector checks. State vector communication occurs when one process looks at another's local variables without affecting them. This type of communication is invisible to the owning process and requires no response from it. In a state vector check, the value of the variable is not changed at the time of the inspection.

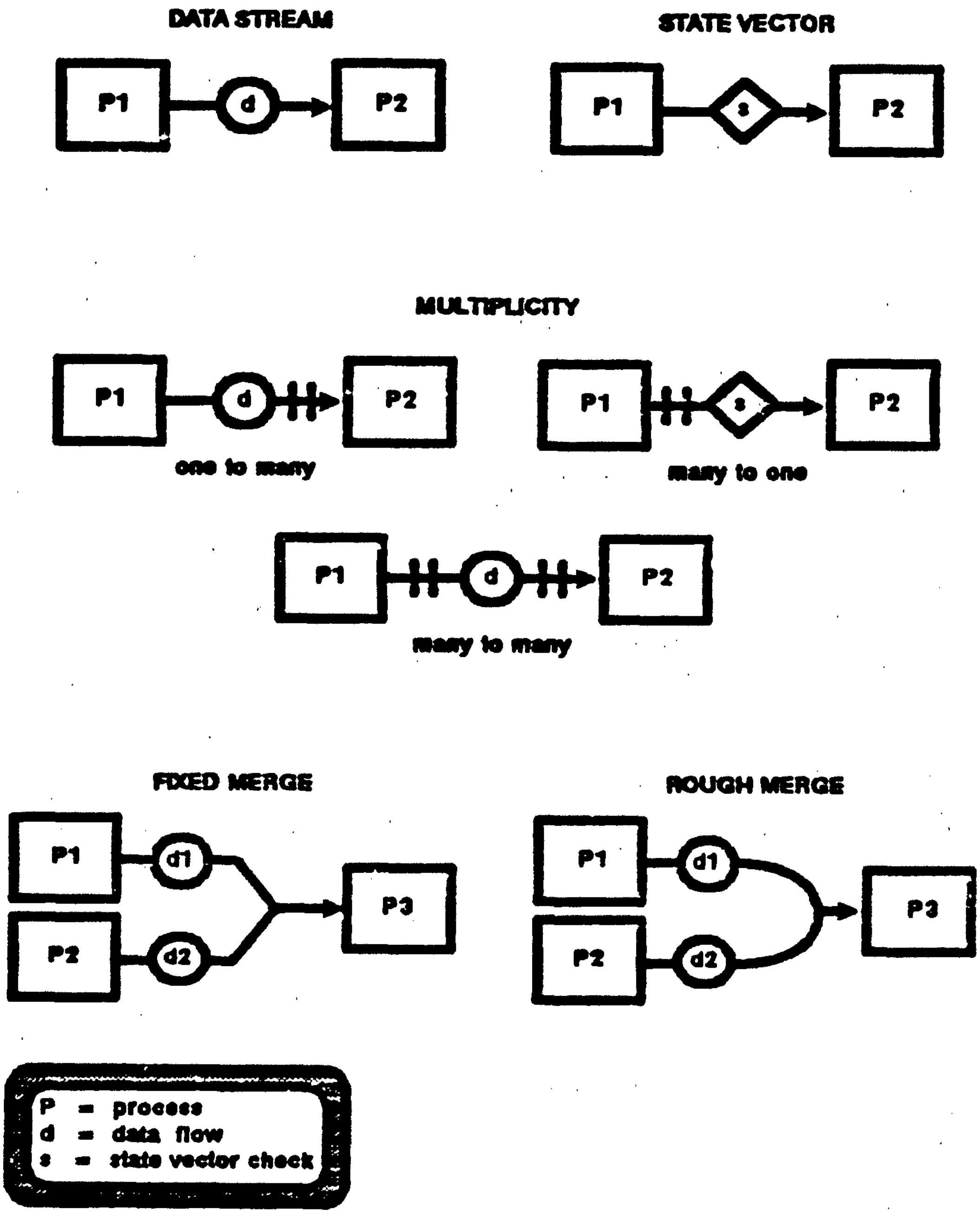

Figure A-2. SSD communication notation

(3) Multiplicity. Multiple holding units, multiple receiving units, or both are possible in JSD and are depicted in SSD by two short parallel lines intersecting the entity's input or output line.

(4) Merging. The capability of a process to obtain or receive the necessary data from more than one source is called merging. Two types of merges are possible: A fixed merge is one in which a different command is executed to access each separate source. A rough merge occurs when a single command can access any of the sources.

5. Methodology. The MOD II design effort has focused on five primary steps in the JSD methodology.

a. Identify entities and actions. The first step in the JSD design process is to identify the entities and actions to be modeled. The model must be rich enough to support all the functional requirements of the system but simple enough that extraneous actions are easily excluded. Real world entities and actions are selected as the result of research and consultation.

b. Create generic entities. The entities and actions are made generic by combining similar ones. If two entities perform the same actions, they can be combined as shown in figure A-3.

c. Develop entity-action structures. Once the entities and actions have been identified, it is necessary to develop a description of each entity, a set of action definitions, and a number of disconnected sequential processes describing the constraints between the actions. These are defined and depicted graphically in the entity-action structure diagrams in the functional area appendixes (C through G). An example taken from appendix E is provided in figure A-4.

d. Develop functions. In designing a simulation, the development of the functions is the most intricate part of the JSD process. Functions are needed to extract information from the model and to generate input for the actions. Functions are needed to first create the situations in which actions can occur through the manipulation and processing of data and then to invoke the actions. Function specifications are defined in narrative form and in structure diagrams similar to the entity-actions diagrams discussed above. The MOD II functions are described in the annexes to each of the functional area appendixes (C through G). An example taken from appendix E is provided in figure A-5.

e. Determine the data flow. Each action is defined in terms of the attributes that it uses and the attributes that it changes. These changes occur as a result of the data flow generated by functions. Each function is described in terms of the data required and the data generated, allowing it to either produce output or invoke actions. This data flow is defined in the system specification diagrams (SSD) drawn

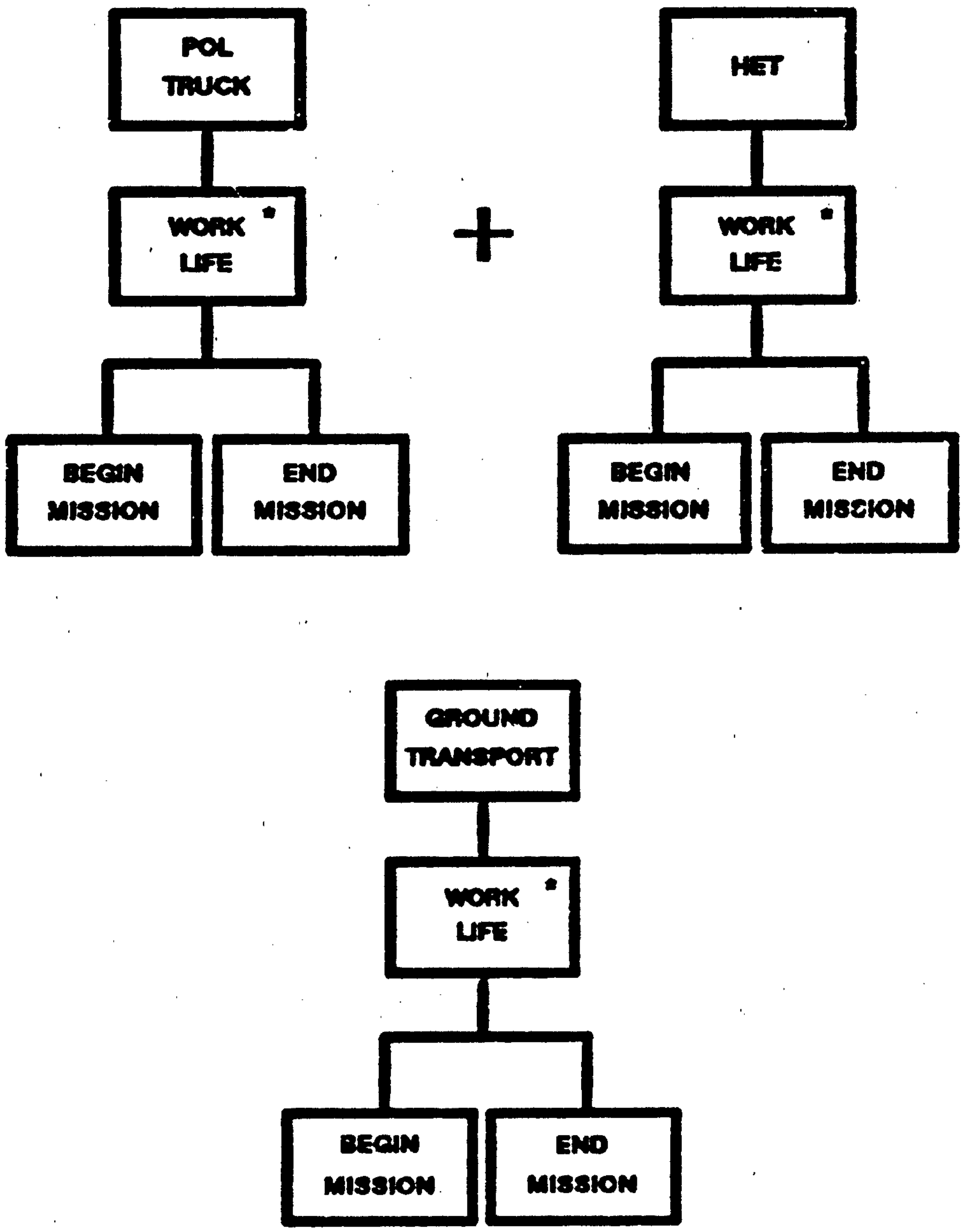

Figure A – 3. Creation of a generic entity

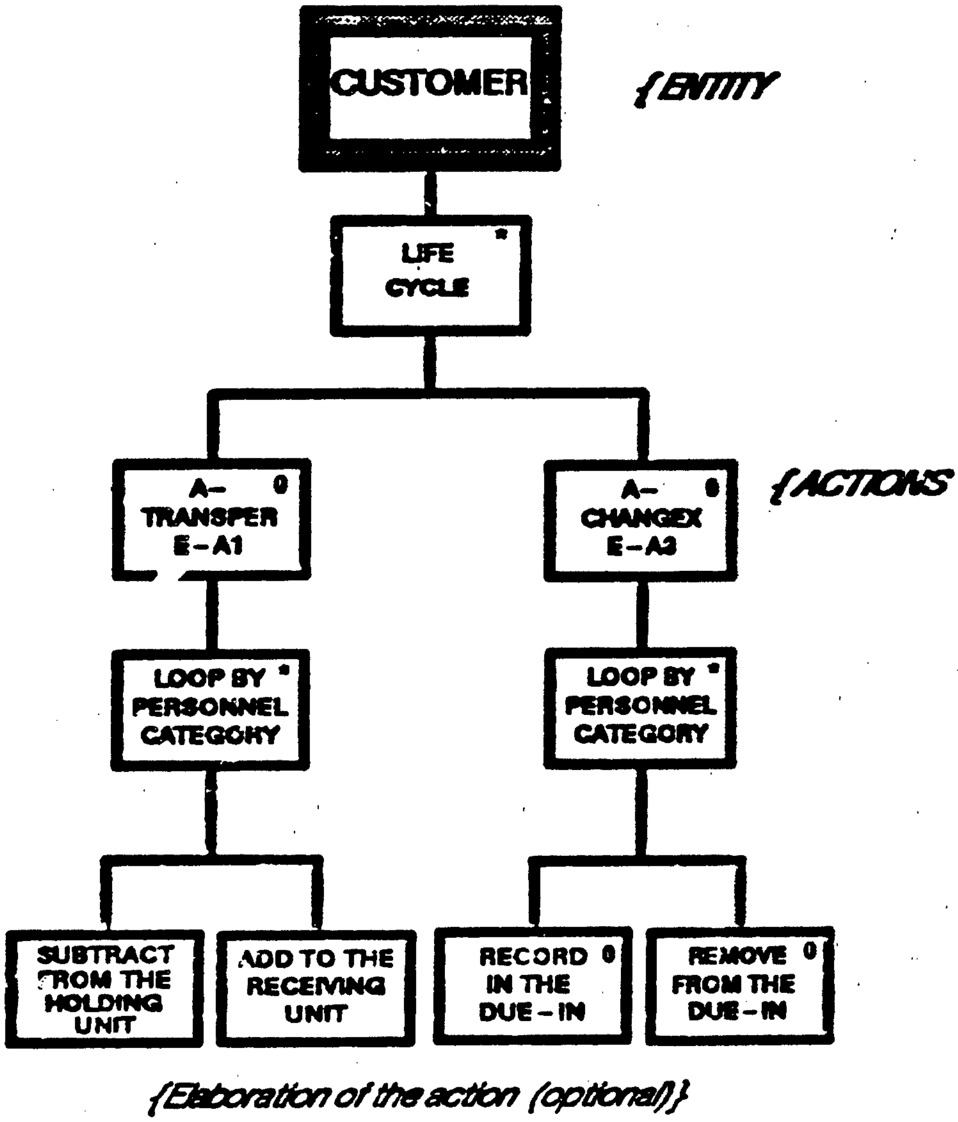

Figure A - 4. Example of an entity - action diagram

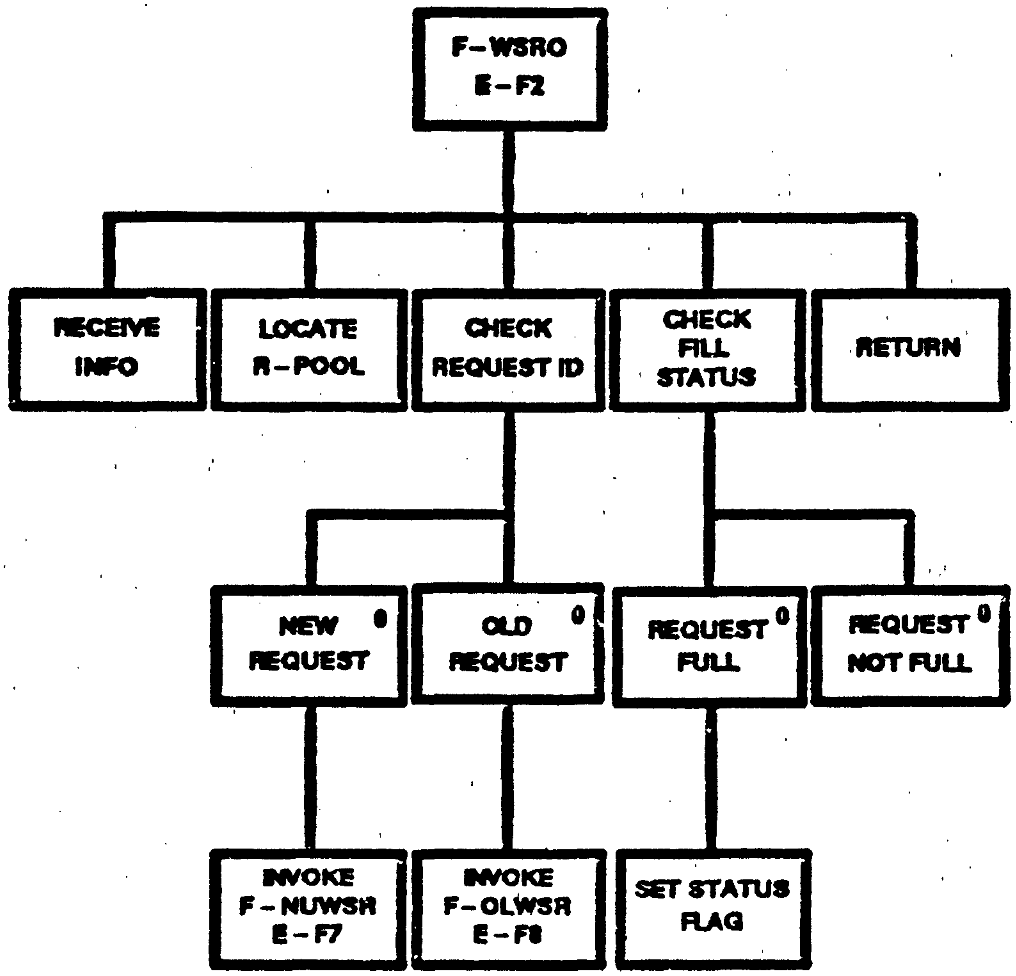

Figure A - 6. Example of a function diagram

for each function. SSD diagrams are inclusive and not sequential in nature. Each one depicts one function, the entities it affects, the data files accessed, and the flow of data through the function. SSD diagrams for each function are included in the annex to each functional area appendix as described above. An example taken from appendix E is provided in figure A-6.

6. MOD II deviations from JSD. Two aspects of the MOD II project resulted in slight modifications of JSD in the application. First, the purpose of the project was to develop a logistics module to be attached to different host models. Thus, many aspects of the MOD II structure had to be adapted to those of a pre-existing, but unspecified, model structure. Second, because JSD was not originally developed for application to large-scale simulations, expertise and documentation concerning simulation applications were limited. MJSL is currently investigating this area and appropriate documentation should be forthcoming in the near future. Various situations arose in which minor adjustments in the JSD approach were required. The major deviations from JSD are described below. (It should be noted that the MJSL representative was consulted regarding these problems and approved the MOD II solutions.)

a. In traditional JSD, functions are invoked by entites and, in turn, trigger actions which update other entities. Seldom do functions invoke other functions. In large-scale simulations, it became too cumbersome, in some instances, to depict all of the intricate processes in one function. Thus, many generator functions in MOD II have been broken down into several functions of more manageable size. (It is to be noted that this often occurs in traditional JSD during the implementation process to increase efficiency.)

b Entities, for the most part, will already exist in the host model. Thus, many of the actions that a JSD entity should perform during its life in the model will already be handled by different areas of the host model. MOD II entity-action sets contain only those aspects of the entities that are actually a part of the MOD II module, either through actual application within the module or through interface requirements with host model. The entity roles to be fullfilled by the host model are specified in appendix H (Host Model Requirements) and are referenced in the appropriate function descriptions in the functional area appendixes.

c. The state vectors of entities pre-existing in a host model will already contain many of the attributes required in MOD II. A conscious effort was made to define entities by the (assumed) existing state vector attributes in order to avoid the problems of large-scale rewriting (of the host model) and extensive duplication.

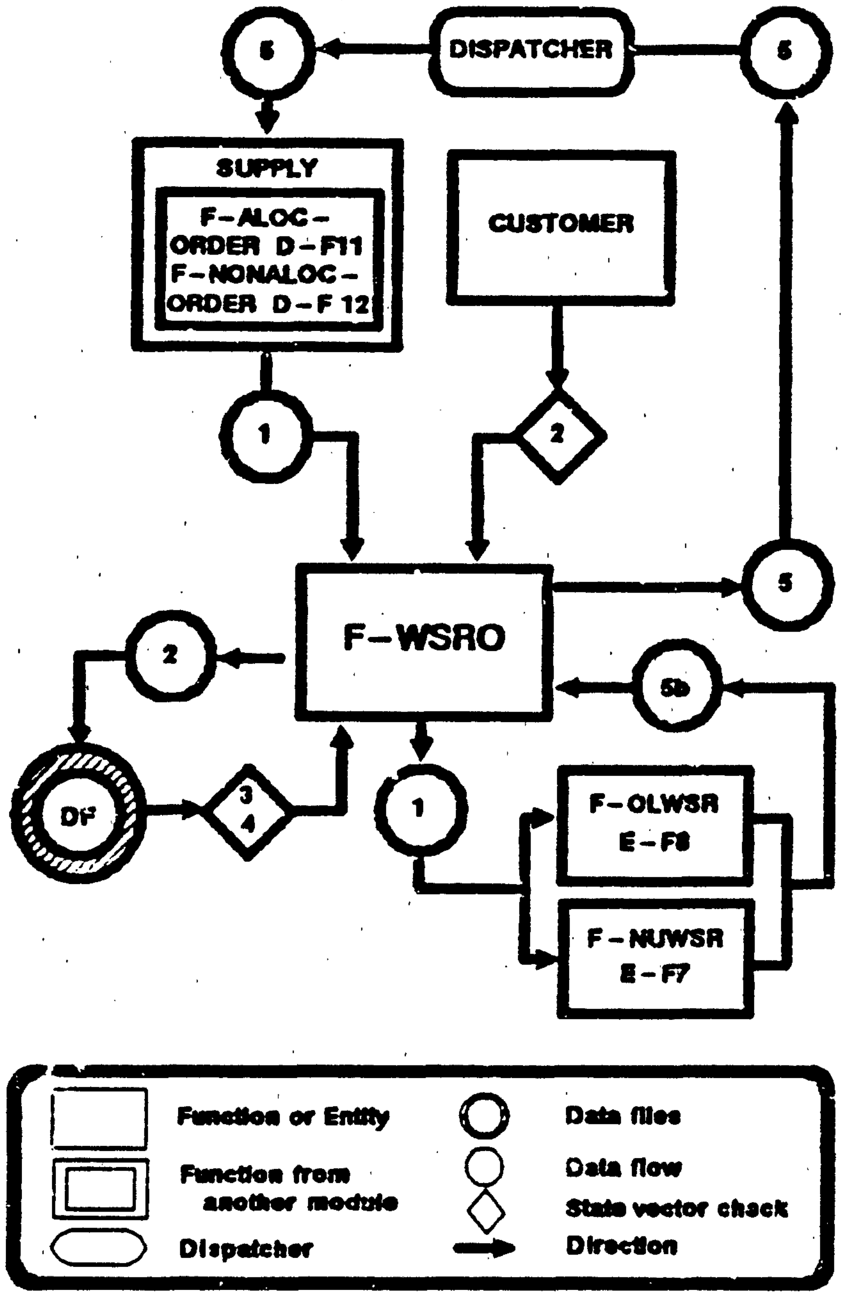

Figure A - 6. Example of a system specification diagram (SSD)

d. In JSD, each entity attribute is changed as the result of only one action. The obvious advantage in this approach lies in the ease of locating errors or making modifications. Because a host model will update the attributes currently in its state vectors, the one-to-one correspondence recommended in JSD cannot be adhered to in MOD II because those attributes already contained in the host model will also be changed there. In MOD II, attribute changes will occur in one of three ways:

- A status flag will be set and reset to specific values by separate, specific actions (e.g., a unit will have its status flag set to a value denoting decon only by the BEGIN-DECON action and reset only by the END-DECON action).

- The value of an attribute will be changed by only one action inside the module but may be changed in other ways by the host model (e.g., a unit may receive personnel only by the TRANSPER action in MOD II but it may lose personnel for many reasons throughout the host model).

- The value of an attribute will be changed in one direction (e.g., added to) by one specific action and in another direction (e.g., subtracted from) by another within the module. For example, a replacement unit (R-POOL) receives replacement personnel only by the TRANSPER action (because it is acting as a customer unit) but it loses personnel by the ASSPER action (because it is acting as a replacement unit).

7. References. More information concerning JSD methodology is available in the publications listed below. References specifically on JSD applications to simulation are currently underway at MJSL and are not yet available.

Cameron, John R. *JSP and JSD: The Jackson Approach to Software Development.* IEEE Computer Society Press, Silver Spring, MD. 1984.

Jackson, M.A. *Principles of Program Design.* Academic Press Inc. Ltd., London, 1975.

Jackson, M.A. *System Development.* Prentice-Hall International. 1983.

King, M.J. and J.P. Pardoe. *Program Design Using JSP: A Practical Introduction.* Wiley and Sons, 1985.

Pressman, R.S. *Software Engineering: A Practitioner's Approach.* McGraw-Hill Series in Software Engineering and Technology, 1982.

APPENDIX B

GLOSSARY

1. ENTITY LIST.

ENTITY NAME	REF NO.
AIR-TRANSP-EX	C-E2
AIR-TRANSP-SPLR	C-E6
ALLOCATION	D-E3
BOOKKEEPER	F-E2
D-CUSTOMER	G-E2
DECON UNIT	G-E1
GND-TRANSP-EX	C-E1
GND-TRANSP-SPLR	C-E7
IMPLICIT-TRANS?	C-E3
P-CUSTOMER	E-E1
R-POOL	E-E2
REPAIR-JOB	F-E1
RQST-MANAGER	C-E5
SUPPLIER	D-E1
SUPPLY-CUSTOMER	D-E2
TRANSP-RQST	C-E4

2. ACTION LIST.

ACTION NAME	REF NO
A-ADD-QUEUE	C-A20
A-ABANDON-RJ	F-A12
A-ASSIGN-LOSS	F-A14
A-ASSPER	E-A2
A-ATTACH	G-A4
A-BEGIN-DECON	G-A1
A-BEGIN-LOAD	C-A13 D-A2
A-BEGIN-PM	C-A9
A-BEGIN-REST	G-A7
A-BEGIN-SET UP	G-A5
A-BEGIN-UNLOAD	C-A11 D-A15
A-CANCEL-ALLOCATION	D-A9
A-CHANGE-CSR	D-A13
A-CHANGEX	E-A3
A-CLASSIFY-RJ	F-A6
A-COMBINE-RJ	F-A3
A-COMPLETE-FILL	C-A25
A-CONSUME-SUPPLY	D-A12
A-CONTAMIN-RJ	F-A4
A-CREATE-ALLOCATION	D-A7
A-CREATE-IMP-UNIT	C-A27

ACTION NAME	REF NO.
A-CREATE-RJ	F-A1
A-CREATE-RQST	C-A22
A-DETACH	G-A3
A-DIE-PRJ	F-A10
A-DISPATCH-AIRCRAFT	C-A3
A-DISPATCH-VEHICLE	C-A1
A-DROP-RQST	C-A26
A-END-DECON	G-A2
A-END-IMP-UNIT	C-A28
A-END-LOAD	C-A14 D-A3
A-END-REST	G-A8
A-END-SETUP	G-A6
A-END-TRAVEL	C-A6
A-END-UNLOAD	C-A12 D-A6
A-EVAC-RJ-EAC	F-A17
A-EVACUATE-RJ	F-A9
A-EXCHANGE-PARTS	F-A5
A-FORWARD-RQST	C-A16
A-GAIN-OH	F-A16
A-IMP-LV-SPLR	C-A19
A-IMP-LV-CUSTOMER	C-A15
A-INVENTORY-PARTS	F-A13
A-LOAD-ALLOCATION	D-A10

ACTION NAME	REF NO.
A-LOSE-OH	F-A15
A-LOSE-REQUEST	D-A11
A-PART-FILL	C-A24
A-PASSBACK-RJ	F-A2
A-PLACE-ORDER	D-A1
A-PROGRESS-RJ	F-A7
A-RECEIVE-AIRCRAFT	C-A4
A-RECEIVE-RQST	C-A23
A-RECEIVE-VEHICLE	C-A2
A-RECOVER	F-A8
A-REDIRECT	C-A8
A-REFILL-WORK-ASSETS	D-A4
A-RETURN-RJ	F-A11
A-SPLIT	C-A17
A-START-TRAVEL	C-A5
A-START-FLIGHT	C-A10
A-START-MOVE	C-A7
A-START-TRANSIT	C-A18
A-SUBT-QUEUE	C-A21
A-TRANSPER	E-A1
A-UPDATE-ALLOCATION	D-A8

3. FUNCTION LIST.

FUNCTION NAME	REF NO
F-AIR-IMP-TRAVEL	C-F8
F-ALLOC-ORDER	D-F14
F-ALLPER	E-F5
F-ARRCRU	E-F12
F-ARRIVE-CUSTOMER	D-F17
F-ARRIVE-SUPPLIER	D-F12
F-ATOBJ-AIR	C-F11
F-ATOBJ-GND	C-F10
F-BATTLE-EFFECT	F-F5
F-BEG-TRANSP-AIR	C-F6
F-BEG-TRANSP-GND	C-F5
F-C2-MEI	D-F7
F-CALPER	E-F6
F-CHKCUS	E-F11
F-CHINV	E-F4
F-CONTAMIN-EFFECT	F-F9
F-CREATE-RQST	C-F1
F-DECISION	G-F1
F-DECON	G-F6
F-DECON-ATOBJ	G-F5
F-DECON-AVAIL	G-F2
F-DETACH	G-F4
F-DIRECT-RQST	C-F2

FUNCTION NAME	REF NO.
F-DISPER	E-F3
F-DONE-CUSTOMER	G-F8
F-DONE-DECON	G-F7
F-EVAC-MANAGER	F-F11
F-EVAC-RECEIVER	F-F12
F-FILL-WAITING	D-F18
F-FILLWS	E-F9
F-FUEL-USED	D-F2
F-GND-IMP-TRAVEL	C-F7
F-HOLD/MOVE-ASSESS	F-F2
F-JF-RQMT	D-F6
F-LIFT-JOB	D-F16
F-LOADPER	E-F14
F-LOCPER	E-F13
F-LOSSES-ALLOC	F-F13
F-NUWSR	E-F7
F-OLWSR	E-F8
F-PEREP	E-F1
F-PF-RQMT	D-F5
F-PREPARE	G-F3
F-RAM/DNBI-INIT	F-F4
F-RECOVERY	F-F6
F-RECOVERY-SHORT	F-F8
F-RECOVERY-SUPPORT	F-F7

FUNCTION NAME	REF NO
F-REDIRECT	C-F9
F-REP-RES-ALLOC	F-F1
F-RO-ORDER	D-F4
F-RO-RQMT	D-F1
F-RO-SUPPLYCK	D-F3
F-RTNS-ALLOC	F-F10
F-SCHED-IMP-TRANSP	C-F14
F-SHIP-AVAIL	D-F10
F-SPLIT-CK	C-F13
F-SUPPER	E-F10
F-SUPPLY-RQST	D-F11
F-SUPPLY-STORE	D-F19
F-TCONTROL	C-F3
F-TRANSFORM	F-F3
F-TRANSP-DECIDE	C-F15
F-TRANSP-DECON	C-F16
F-TRANSP-PM	C-F12
F-TRANSP-RETURN	C-F17
F-TSUPPLIER	C-F4
F-TU-DECISION	D-F15
F-TU-LOSSES	D-F13
F-WSRO-SPLY-AVL	D-F9
F-WSRO-SPLY-RQD	D-F8
F-WSRO	E-F2

APPENDIX C

TRANSPORTATION

The transportation appendix includes the sections listed below. Note that reference numbers are coded to indicate both the functional area (the appendix letter [C] is used) and the type (E = entity, A = action, F = function) involved. Thus, C-A1 refers to the first action listed in transportation (appendix C). For information on the JSD diagram notation discussed, see appendix A.

1. Entity list. The entity list contains the reference number, the name, and the definition (summary and attributes) of each entity used in transportation.

2. Action list. The action list contains the reference number, the name, and the definition (summary, attributes, generators, and associated entities) of each action belonging to the entities in transportation.

3. Entity-action diagrams and cross-reference table. The cross-reference table provides a mapping of entities and actions. One JSD entity-action structure diagram is provided for each entity. Following each diagram is a narrative description of each action shown.

4. Generator function list. The function list contains the reference number, name, and definition (summary, triggering mechanisms, and resulting actions) of each function associated with transportation. Detailed descriptions of each function are contained in the annex.

5. Annex. The contents of the annex are as follows:

a. Dispatcher. The dispatcher serves as a road map to the functions. It is not a JSD structure diagram, but it is presented in tree form to show the hierarchical nature of the structure involved. The root of the tree is the dispatcher. The top-level nodes (boxes) identify the critical events occurring in transportation and the subsequent nodes (boxes) identify the functions (and show the interrelationships) involved. The calling routines and triggering mechanisms for each critical event are listed above the event node. The actions and events caused by a function are listed below the function node. Each critical event is numbered for identification purposes only; no ordering is implied. The event scheduler (SCHED) uses the critical event numbers to identify the event being scheduled by a function.

5. <u>Annex</u> (cont.)

b. <u>Functions</u>. The following information is provided for each function belonging to transportation. Note that the reference number of the function (e.g., <u>C-F1</u>) appears at top of each page.

(1) Function summary. The function summary contains the reference number, name, and definition of a function. The definition contains a summarized narrative, a list of the mechanisms which can trigger the function, and a list of the actions and functions which can result from the function.

(2) System specification diagram (SSD). The SSD is a JSD structure diagram of the data flow to and from a specified function. It shows the static relationships between the entities and functions involved; no calling sequence or hierarchical relationship is implied. In addition to the standard JSD SSD notation (see appendix A), special notation has been adopted to indicate ownership. A single box is used to denote a function belonging to the specified functional area (e.g., transportation). Plain double boxes indicate functions belonging to another CSS area. The area is identified in the outer box and the functions involved are listed in the inner box. Patterned double boxes (diagonal slashes in the outer box) indicate functions belonging to the host model. Whenever possible, the particular module is identified in the inner box (e.g., movement, air). A timer is considered part of the CSS module and is represented by a plain double circle; data files (DF) will belong to the entire model and are depicted by a patterned double circle. Note that although more than one data file (or timer) may be used by the specified function, only one representation (circle) will appear in the diagram. The individual data files will be identified in the corresponding data definition table.

(3) Data definition. This table provides a listing of the data elements and structures required for the specified function and comments on their usage. The connection numbers correspond to the data flow numbers shown on the SSD. A "D" or "S" is added to distinguish between data and state vector elements. Detailed descriptions of the data files can be found in appendices J and K.

(4) Generator diagram. The generator diagram is similar to the JSD entity-action diagrams described in paragraph 3 above. Each node (box) depicts either an iteration, a selection, or a sequential step required by the process.

(5) Generator description. The generator description provides a detailed narrative of the function process. Step numbers correspond to the box numbers shown on the associated generator diagram. Data elements cited refer to the data listed in the associated data definition table.

1. ENTITY LIST.

C-E1 GND-TRANSP-EX

SUMMARY: The explicit ground transportation entity models the life of a ground transporter. The transporter can consist of one or more vehicles. The life of the entity begins when it is created to perform a specific task and continues through the completion or the cancellation of the mission or destruction of the transporter.

ATTRIBUTES:

- Unit ID
- Objective unit ID
- Customer location
- Movement flag
- Status flag
- Vehicle type
- Current location
- Objective location
- Commodity inventory
- Parent unit ID
- Vehicle quantity

C-E2 AIR-TRANSP-EX

SUMMARY: This entity models the life of an air transporter. The transporter can consist of one or more aircraft, fixed wing or helicopter. The life of the entity begins when it iscreated to perform a specific task and ends when the mission is completed or cancelled or when the transporter is destroyed.

ATTRIBUTES:

- Unit ID
- Objective unit ID
- Customer location
- Movement flag
- Status flag
- Aircraft type
- Current location
- Objective location
- Commodity inventory
- Parent unit ID
- Aircraft quantity

C-E3 IMPLICIT-TRANSP

SUMMARY: This entity models any transporter that is not to be explicitly represented. Transportation by this entity will buy delay time.

ATTRIBUTES:

- Unit ID
- Objective unit ID
- Customer location
- Commodity inventory
- Parent unit ID
- Vehicle quantity
- Current location
- Supplier location
- Movement flag
- Time created
- Vehicle type

C-E4 TRANSP-RQST

SUMMARY: This entity represents the life of one request for transportation support. The request can be issued by any functional area (ex: supply, maintenance, personnel).

ATTRIBUTES:

Customer unit ID	Supply unit ID
Supply type	Commodity type
Commodity quantity	Request type
Time created	

C-E5 RQST-MANAGER

SUMMARY: As requests for transportation support are received, they are placed on a queue. One queue will be at every transportation controller and supplier. One RQST-MANAGER entity will control each queue.

ATTRIBUTES:

Transport supplier ID	Commodity type
Commodity quantity	Time request created

C-E6 AIR-TRANSP-SPLR

SUMMARY: This entity models any unit that has air transportation assets. These air assets can be either for self use only or for support of other air transportation users.

ATTRIBUTES:

Unit ID	Aircraft inventory
Parent unit ID	

C-E7 GND-TRANSP-SPLR

SUMMARY: This entity models any unit that has ground transportation assets. These ground assets can be either for self use only or for support of other ground transportation users.

ATTRIBUTES:

Unit ID	Parent unit ID
Vehicle inventory	

2. ACTION LIST.

C-A1 A-DISPATCH-VEHICLE

SUMMARY: A ground transportation supplier creates a temporary transport unit to perform a specific task.

ATTRIBUTES:	Transport unit ID Vehicle type	Parent unit ID Vehicle quantity
GENERATOR:	F-TSUPPLIER F-SPLIT-CK	(C-F4) (C-F13)
ENTITY:	GND-TRANSP-EX GND-TRANSP-SPLR	(C-E1) (C-E7)

C-A2 A-RECEIVE-VEHICLE

SUMMARY: A temporary ground transport unit has completed a task and is reclaimed by the originating supplier.

ATTRIBUTES:	Transport unit ID Vehicle type	Parent unit ID Vehicle quantity
GENERATOR:	F-TRANSP-PM	(C-F12)
ENTITY:	GND-TRANSP-EX GND-TRANSP-SPLR	(C-E1) (C-E7)

C-A3 A-DISPATCH-AIRCRAFT

SUMMARY: An aircraft transportation supplier creates a temporary transport unit to perform a specific task.

ATTRIBUTES:	Unit ID Aircraft type	Parent unit ID Aircraft quantity
GENERATOR:	F-TSUPPLIER	(C-F4)
ENTITY:	AIR-TRANSP-EX AIR-TRANSP-SPLR	(C-E2) (C-E6)

C-A4 **A-RECEIVE-AIRCRAFT**

SUMMARY: When a temporary air transport unit has completed a task, it is reclaimed by the originating transport supplier.

ATTRIBUTES:	Transporter unit ID Type of aircraft	Parent unit ID Quantity of aircraft
GENERATOR:	F-TRANSP-PM	(C-F12)
ENTITY:	AIR-TRANSP-EX AIR-TRANSP-SPLR	(C-E2) (C-E6)

C-A5 **A-START-TRAVEL**

SUMMARY: Implicit travel has begun for either an explicit ground transporter or an explicit air transporter.

ATTRIBUTES:	Next objective	
GENERATOR:	F-BEG-TRANSP-AIR F-BEG-TRANSP-GND	(C-F6) (C-F5)
ENTITY:	AIR-TRANSP-EX GND-TRANSP-EX	(C-E2) (C-E1)

C-A6 **A-END-TRAVEL**

SUMMARY: Implicit travel has been completed for an explicit ground transporter or an explicit air transporter.

ATTRIBUTES:	Current location	Objective unit status
GENERATOR:	F-ATOBJ-GND F-ATOBJ-AIR	(C-F10) (C-F11)
ENTITY:	AIR-TRANSP-EX GND-TRANSP-EX	(C-E2) (C-E1)

C-A7 A-START-MOVE

SUMMARY: Explicit travel has begun for an explicit ground transporter. The movement module is called.

ATTRIBUTES:	Next objective	
GENERATOR:	F-BEG-TRANSP-GND	(C-F5)
ENTITY:	GND-TRANSP-EX	(C-E1)

C-A8 A-REDIRECT

SUMMARY: The objective has been changed. The change can be made because the objective unit status has changed or because a gamer has redirected the transporter.

ATTRIBUTES: Objective unit ID Objective location
Flag indicating gamer or model change
Old objective location (i.e., the supplier or customer destination)

GENERATOR:	F-REDIRECT	(C-F9)
ENTITY:	AIR-TRANSP-EX	(C-E2)
	GND-TRANSP-EX	(C-E1)

C-A9 A-BEGIN-PM

SUMMARY: When an explicit transporter, ground or air, has completed a task and has returned to the supplying unit, it must undergo preventive maintenance (PM) (represented by a delay cycle) before being reclaimed by the transportation supplier.

ATTRIBUTES: Unit ID Unit status flag

GENERATOR:	F-ATOBJ-GND	(C-F10)
	F-ATOBJ-AIR	(C-F11)
ENTITY:	AIR-TRANSP-EX	(C-E2)
	GND-TRANSP-EX	(C-E1)

C-A10 A-START-FLIGHT

SUMMARY: Explicit travel has begun for an explicit air transporter. The air module is called.

ATTRIBUTES: Next objective unit ID

GENERATOR: F-BEG-TRANSP-AIR (C-F6)

ENTITY: AIR-TRANSP-EX (C-E2)

C-A11 A-BEGIN-UNLOAD

SUMMARY: An explicit transporter has started the unload process at a customer.

ATTRIBUTES: Commodity type Commodity quantity

GENERATOR: Supply Module

ENTITY:

GND-TRANSP-EX	(C-E1)
AIR-TRANSP-EX	(C-E2)
CUSTOMER	(D-E1)

C-A12 A-END-UNLOAD

SUMMARY: An explicit transporter has completed the unload process at a customer. A test is done to determine if the transporter is air or ground. If the transporter is an aircraft, the unloading process could have been an airdrop or a land and deliver mission.

ATTRIBUTES: Commodity type Commodity quantity

GENERATOR: Supply Module

ENTITY:

GND-TRANSP-EX	(C-E1)
AIR-TRANSP-EX	(C-E2)
SUPPLIER	(D-E2)

C-A13 A-BEGIN-LOAD

SUMMARY: An explicit transporter has started the load process at a supplier.

ATTRIBUTES:	Commodity type	Commodity quantity
GENERATOR:	Supply Module	
ENTITY:	GND-TRANSP-EX	(C-E1)
	AIR-TRANSP-EX	(C-E2)
	SUPPLIER	(D-E2)

C-A14 A-END-LOAD

SUMMARY: An explicit transporter has completed the load process at a customer.

ATTRIBUTES:	Commodity type	Commodity quantity
GENERATOR:	Supply Module	
ENTITY:	AIR-TRANSP-EX	(C-E2)
	GND-TRANSP-EX	(C-E1)
	SUPPLIER	(D-E2)

C-A15 A-IMP-LV-CUSTOMER

SUMMARY: After an implicit unit's commodity has been unloaded, the implicit transporter begins the return trip (represented by a delay period) to the parent unit .

ATTRIBUTES:	Commodity type, quantity	Unit location
GENERATOR:	F-SCHED-IMP-TRANSP	(C-F14)
ENTITY:	IMPLICIT-TRANSP	(C-E3)

C-A16 A-FORWARD-RQST

SUMMARY: If a request cannot be filled by the current controller, it is sent to the next controller in the report structure.

ATTRIBUTES:	Request ID	New control unit
GENERATOR:	F-TCONTROL	(C-F3)
ENTITY:	TRANSP-RQST	(C-E4)

C-A17 A-SPLIT

SUMMARY: When a supplier cannot fill the entire request, the ground transporter is separated into two explicit transporter units. One to load the items at the current supply location; one to proceed to the next supply location.

ATTRIBUTES: Transportation mode flag
Commodity type and quantity

GENERATOR: F-SPLIT-CK (C-F13)

ENTITY: GND-TRANSP-EX (C-E1)

C-A18 A-START-TRANSIT

SUMMARY: An implicit transporter, air or ground, has begun an implicit move represented by a delay period.

ATTRIBUTES: Objective location; Movement flag; Parent unit ID; Customer unit ID; Supplier unit ID

GENERATOR: F-SCHED-IMP-TRANSP (C-F14)

ENTITY: IMPLICIT-TRANSP (C-E3)

C-A19 A-IMP-LV-SPLR

SUMMARY: An implicit transporter has completed an implicit move to the supplier and is loaded and ready.

ATTRIBUTES: Movement flag (indicating unit not moving)
Location ID (Parent/Customer/Supplier unit ID)

GENERATOR: F-SCHED-IMP-TRANSP (C-F14)

ENTITY: IMPLICIT-TRANSP (C-E3)

C-A20 A-ADD-QUEUE

SUMMARY: When a request received by a transportation controller cannot be satisfied immediately, it is added to the queue for that controller.

ATTRIBUTES:	Request ID		Control unit ID
GENERATOR:	F-TCONTROL (C-F3)		F-DIRECT-RQST (C-F2)
ENTITY:	RQST-MANAGER		(C-E5)

C-A21 A-SUBT-QUEUE

SUMMARY: When a transportation controller has assets available, the highest priority request is taken off its queue.

ATTRIBUTES:	Request ID		Control unit ID
GENERATOR:	F-TCONTROL (C-F3)		F-TSUPPLIER (C-F4)
ENTITY:	RQST-MANAGER		(C-E5)

C-A22 A-CREATE-RQST

SUMMARY: A request has been generated by a transportation user and will be sent to a transportation controller.

ATTRIBUTES:	Customer unit ID	Supply unit ID
	Supply type	Request ID
	Commodity type, quantity	Request type
GENERATOR:	F-CREATE-RQST	(C-F1)
ENTITY:	TRANSP-RQST	(C-E4)

C-A23 A-RECEIVE-RQST

SUMMARY: A task has been received by a transportation controller.

ATTRIBUTES:	Control unit ID	Request ID
GENERATOR:	F-DIRECT-RQST	(C-F2)
ENTITY:	TRANSP-RQST	(C-E4)

C-A24 A-PART-FILL

SUMMARY: If the requirement to fill a transportation request can only be partially met by the transport supplier, the vehicles/aircraft that are available are sent.

ATTRIBUTES:	Request ID	Commodity remaining
GENERATOR:	F-TCONTROL	(C-F3)
ENTITY:	TRANSP-RQST	(C-E4)

C-A25 A-COMPLETE-FILL

SUMMARY: The entire requirement to fill a transportation task is filled by the transportation supplier.

ATTRIBUTES:	Commodity type Request ID	Commodity quantity Transport supplier ID
GENERATOR:	F-TCONTROL	(C-F3)
ENTITY:	TRANSP-RQST	(C-E4)

C-A26 A-DROP-RQST

SUMMARY: When a request cannot be filled and the decision is made to not hold it, it is dropped.

ATTRIBUTES:	Request ID	
GENERATOR:	F-TCONTROL F-TSUPPLIER	(C-F3) (C-F4)
ENTITY:	TRANSP-RQST	(C-E4)

C-A27 A-CREATE-IMP-UNIT

SUMMARY: An implicit unit record is created for an implicit transport unit to perform a specific task.

ATTRIBUTES:	Unit ID Vehicle type, quantity	Parent unit Time created
GENERATOR:	F-TSUPPLIER	(C-F4)
ENTITY:	IMPLICIT-TRANSP	(C-E3)

C-A28 A-END-IMP-UNIT

SUMMARY: When an implicit unit's mission is complete, it can be deleted.

ATTRIBUTES:	Unit ID	Parent unit
GENERATOR:	F-SCHED-IMP-TRANSP	(C-F14)
ENTITY:	IMPLICIT-TRANSP	(C-E3)

3. ENTITY-ACTION CROSS-REFERENCE AND DIAGRAMS.

ENTITY		ACTION	
GND-TRANSP-EX	(C-E1)	A-START-TRAVEL	(C-A5)
		A-END-TRAVEL	(C-A6)
		A-START-MOVE	(C-A7)
		A-BEGIN-PM	(C-A9)
		A-RECEIVE-VEHICLE	(C-A2)
		A-BEGIN-UNLOAD	(C-A11)
		A-END-UNLOAD	(C-A12)
		A-BEGIN-LOAD	(C-A13)
		A-END-LOAD	(C-A14)
		A-SPLIT	(C-A17)
		A-DISPATCH-VEHICLE	(C-A1)
		A-REDIRECT	(C-A8)
AIR-TRANSP-EX	(C-E2)	A-DISPATCH-AIRCRAFT	(C-A3)
		A-RECEIVE-AIRCRAFT	(C-A4)
		A-START-TRAVEL	(C-A5)
		A-END-TRAVEL	(C-A6)
		A-START-MOVE	(C-A7)
		A-REDIRECT	(C-A8)
		A-BEGIN-PM	(C-A9)
		A-BEGIN-UNLOAD	(C-A11)
		A-END-UNLOAD	(C-A12)
		A-BEGIN-LOAD	(C-A13)
		A-END-LOAD	(C-A14)
IMPLICIT-TRANSP	(C-E3)	A-IMP-LV-CUSTOMER	(C-A15)
		A-START-TRANSIT	(C-A18)
		A-IMP-LV-SPLR	(C-A19)
		A-CREATE-IMP-UNIT	(C-A27)
		A-END-IMP-UNIT	(C-A28)
TRANSP-RQST	(C-E4)	A-CREATE-RQST	(C-A22)
		A-RECEIVE-RQST	(C-A23)
		A-PART-FILL	(C-A24)
		A-COMPLETE-FILL	(C-A25)
		A-DROP-RQST	(C-A26)
		A-FORWARD-RQST	(C-F30)
RQST-MANAGER	(C-E5)	A-ADD-QUEUE	(C-A20)
		A-SUBT-QUEUE	(C-A21)
AIR-TRANSP-SPLR	(C-E6)	A-DISPATCH-AIRCRAFT	(C-A3)
		A-RECEIVE-AIRCRAFT	(C-A4)
GND-TRANSP-SPLR	(C-E7)	A-DISPATCH-VEHICLE	(C-A1)
		A-RECEIVE-VEHICLE	(C-A2)

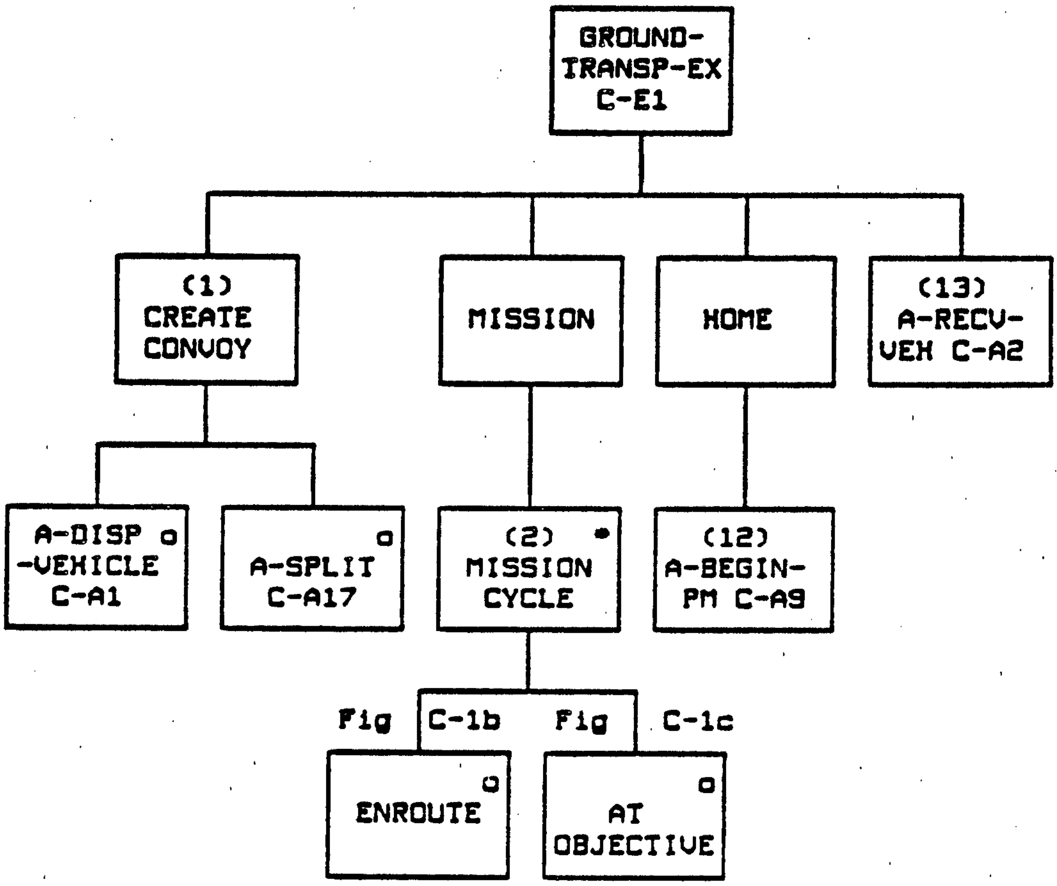

Figure C-1a. Entity-action diagram for GROUND-TRANSP-EX

C-E1

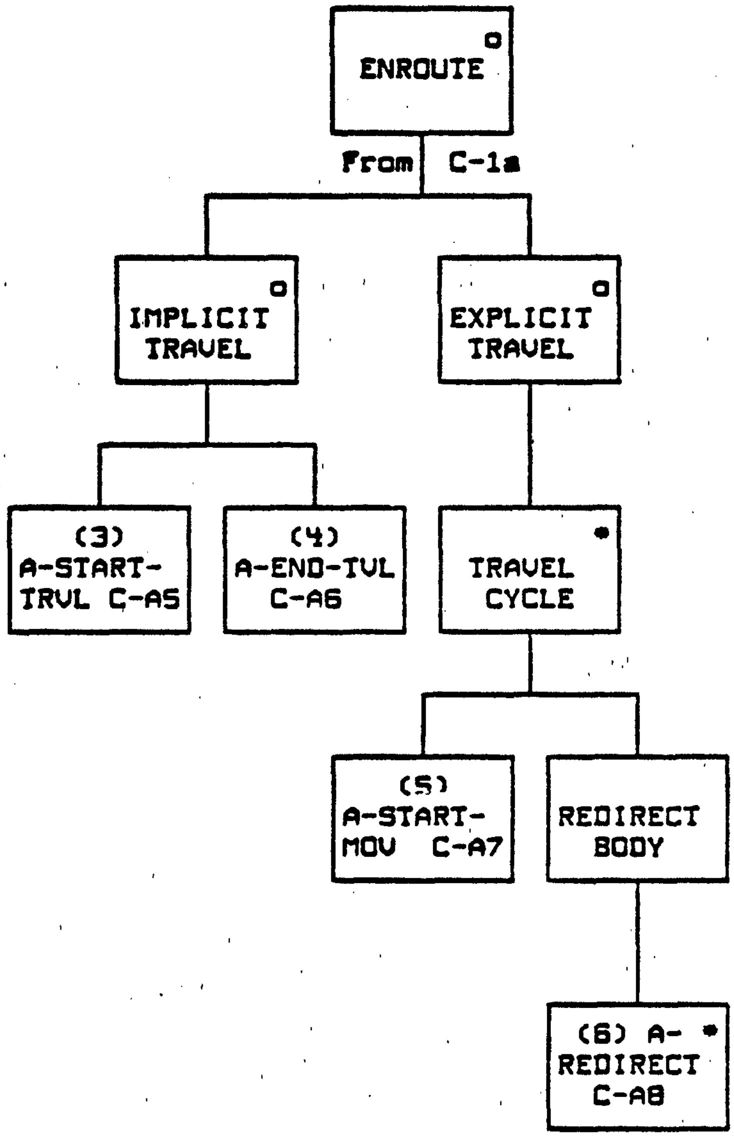

Figure C-1b. Entity-action diagram for GROUND-TRANSP-EX (continued)

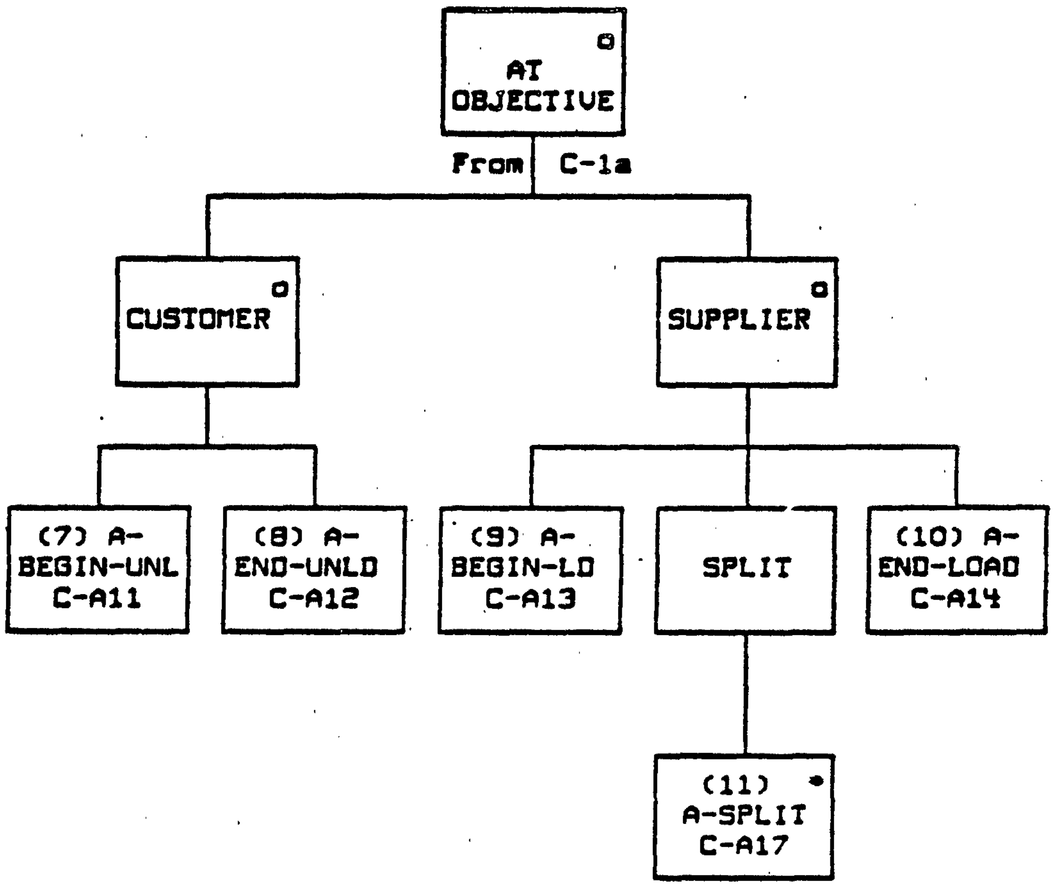

Figure C-1c. Entity-action diagram for GROUND-TRANSP-EX (continued)

ENTITY-ACTION DESCRIPTION: GND-TRANSP-EX (C-E1)

1. CREATE CONVOY. Create the temporary convoy unit by triggering either A-DISPATCH-VEHICLE (C-A1) or A-SPLIT (C-A17) to divide an existing convoy in two. (This occurs when the split section is to receive a new objective.)

2. MISSION CYCLE. Loop until the mission is complete. A mission can loop zero or more times.

3. A-START-TRAVEL (C-A5). Start an implicit move segment.

4. A-END-TRAVEL (C-A6). Stop an implicit move segment. The objective should be reached.

5. A-START-MOVE (C-A7). Begin an explicit move. The movement module is called.

6. A-REDIRECT (C-A8). The objective is changed. The objective can be changed zero or more times.

7. A-BEGIN-UNLOAD (C-A11). Begin the delay to unload the transporter. This action is triggered by the supply module when lift capability is available.

8. A-END-UNLOAD (C-A12). The unload delay has elapsed so end the unload delay.

9. A-BEGIN-LOAD (C-A13). Begin the delay to load the transporter. This action is triggered by the supply module when lift capability is available.

10. A-END-LOAD (C-A14). The load delay has elapsed so end the load delay.

11. A-SPLIT (C-A17). A transporter must split into two convoys. This normally is because one supplier does not have all of the supplies needed. The split section will continue with the same objective (as compared with the split action described in step 1 above).

12. A-BEGIN-PM (C-A9). After a mission is complete, the transporter must undergo preventive maintenance before being reclaimed by the parent unit.

13. A-RECEIVE-VEHICLE (C-A2). The mission and PM are completed so the temporary unit is deleted (i.e., the transporter is reclaimed by the parent unit).

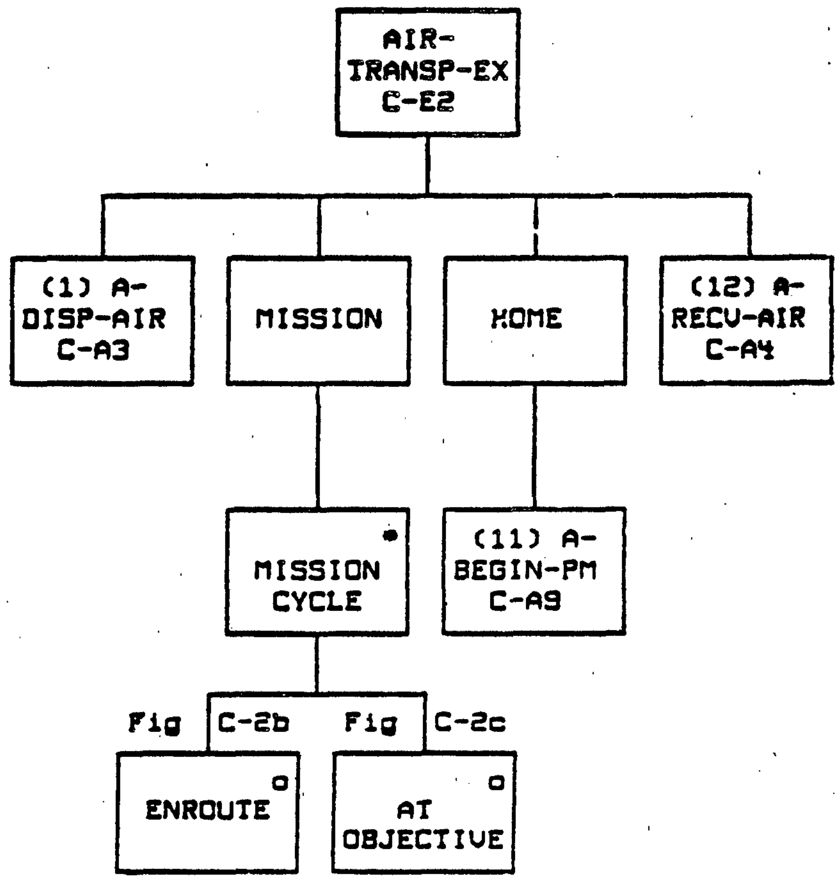

Figure C-2a. Entity-action diagram for AIR-TRANSP-EX

C-E2

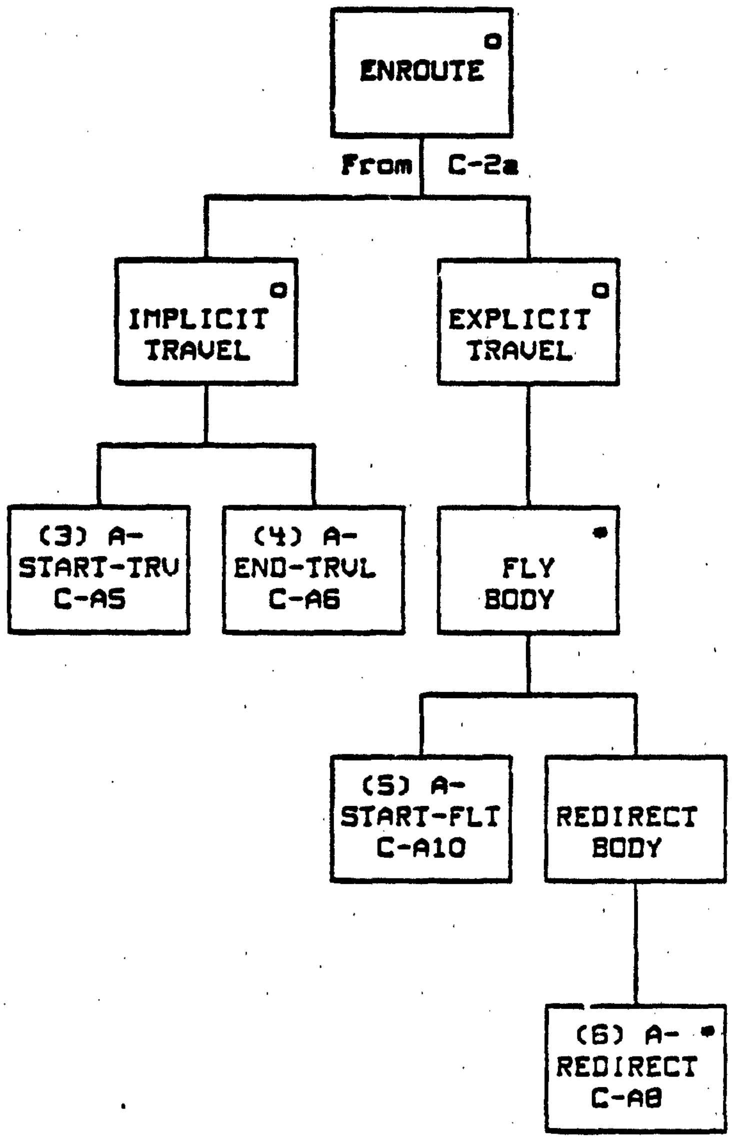

Figure C-2b. Entity-action diagram for AIR-TRANSP-EX (continued)

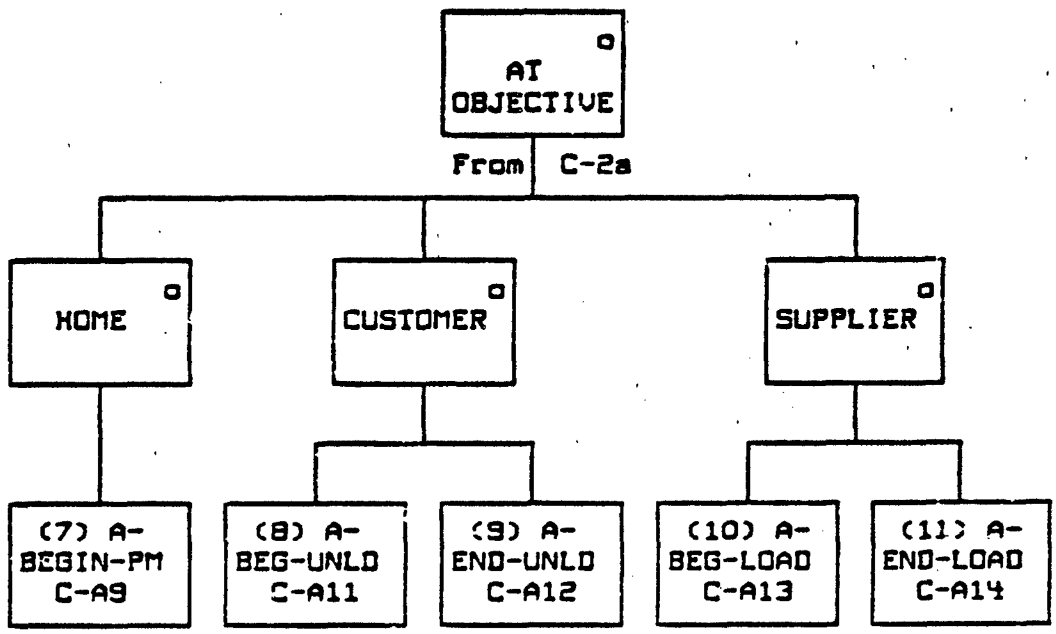

Figure C-2c. Entity-action diagram for AIR-TRANSP-EX (continued)

ENTITY-ACTION DESCRIPTION: AIR-TRANSP-EX (C-E2)

1. CREATE CONVOY. Create the temporary air transport unit by triggering A-DISPATCH-AIRCRAFT (C-A3).

2. MISSION CYCLE. Loop until the mission is complete. A mission can loop zero or more times.

3. A-START-TRAVEL (C-A5). Start an implicit move segment.

4. A-END-TRAVEL (C-A6). Stop an implicit move segment. The objective should be reached.

5. A-START-FLIGHT (C-A10). Begin an explicit move. The movement module is called.

6. A-REDIRECT (C-A8). The objective is changed. The objective can be changed zero or more times.

7. A-BEGIN-UNLOAD (C-A11). Begin the delay to unload the transporter. This action is triggered by the supply module when lift capability is available.

8. A-END-UNLOAD (C-A12). The unload delay has elapsed so end the unload delay.

9. A-BEGIN-LOAD (C-A13). Begin the delay to load the transporter. This action is triggered by the supply module when lift capability is available.

10. A-END-LOAD C-A14). The load delay has elapsed so end the load delay.

11. A-BEGIN-PM (C-A9). After a mission is complete, the transporter must undergo preventive maintenance before being reclaimed by the parent unit.

12. RECEIVE-AIRCRAFT (C-A4). The mission is complete so delete the temporary unit.

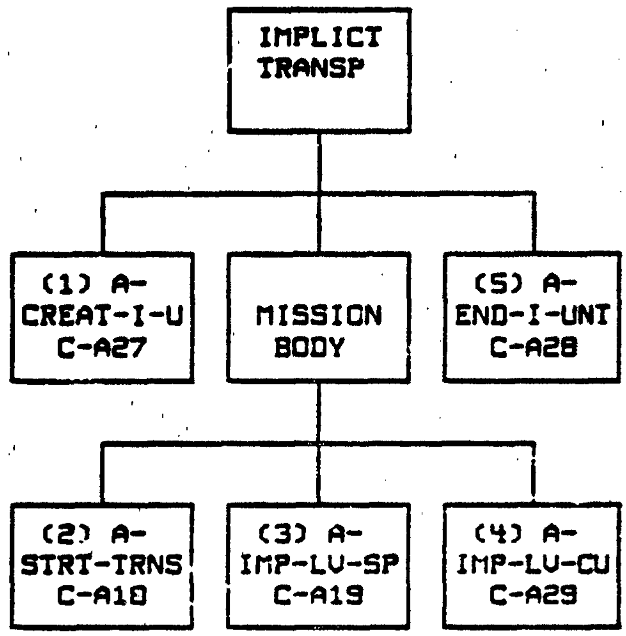

Figure C-3. Entity-action diagram for IMPLICIT-TRANSP

ENTITY-ACTION DESCRIPTION: IMPLICIT-TRANSP (C-E3)

1. A-CREATE-IMP-UNIT (C-A27). Create a record for the temporary unit.

2. A-START-TRANSIT (C-A18). Start the implicit transporter on the first leg of the mission. The delay for loading at the supplier is added to this delay.

3. A-IMP-LV-SPLR (C-A19). Start the implicit transporter on the supplier to customer leg of the mission. The delay to unload at the customer is added here.

4. A-IMP-LV-CUSTOMER (C-A15). Start the implicit transporter on the customer to home leg of the mission. Any PM time needed before the transporters are available again is added here.

5. A-END-IMP-UNIT (C-A28). Add the implicit unit assets back into the parent unit and delete the implicit unit record.

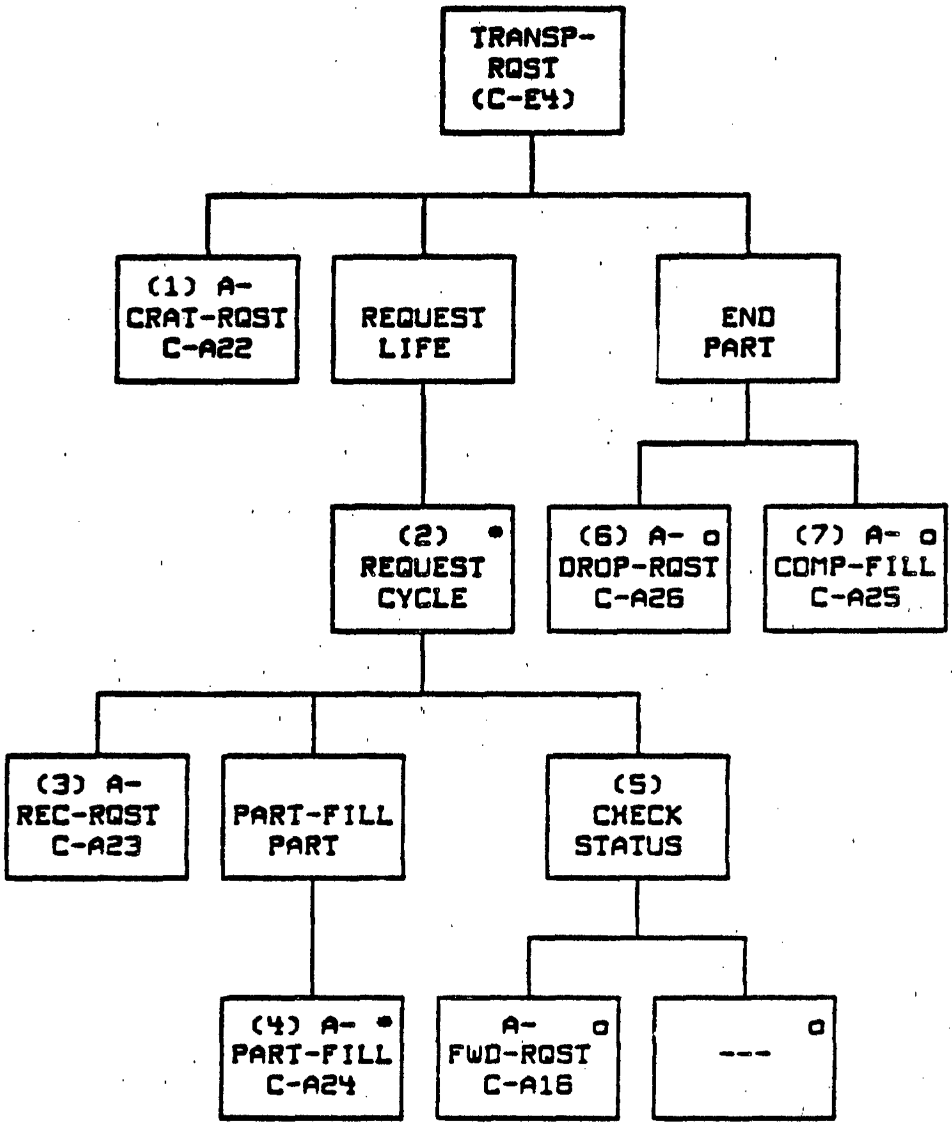

Figure C-4. Entity-action diagram for TRANSP-RQST

ENTITY-ACTION DESCRIPTION: TRANSP-RQST (C-E4)

1. A-CREATE-RQST (C-A22). A request-for-transportation record is created.

2. RQST CYCLE. Loop until the request is filled or dropped. The cycle is necessary because the request can be passed to different controllers for processing.

3. A-RECEIVE-RQST (C-A23). The request is received at a control unit. Any time a request is received by a new control unit, this action is executed.

4. A-PART-FILL (C-A24). This action is performed zero or more times. If the request is filled by one transport supplier, no part fill will be executed. If one transport supplier cannot fill the request, one part-fill will be executed for each transport supplier.

5. CHECK STATUS. If the request is not completely filled, the decision is made whether to hold the request or to forward it to the next controller. If it is to be forwarded, A-FORWARD-RQST (C-A16) is triggered.

6. A-DROP-RQST (C-A26). If the request has been on the queue longer than the maximum time and it cannot be filled, it is dropped and the request record is deleted.

7. A-COMPLETE-FILL (C-A25). This action is performed when the request is completely filled.

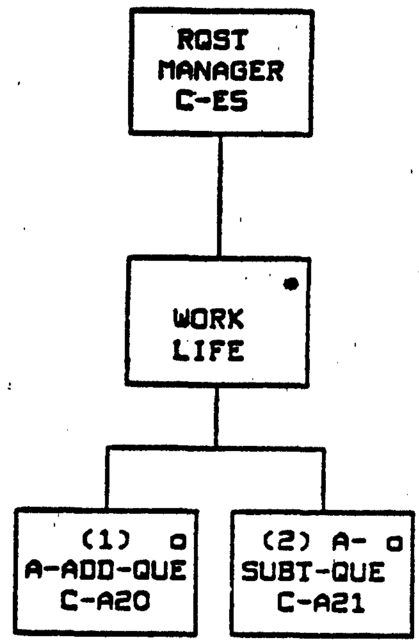

Figure C-5. Entity-action diagram for RQST-MANAGER

ENTITY-ACTION DESCRIPTION: RQST-MANAGER (C-E5)

1. A-ADD-QUEUE (C-A20). Add one request to the transportation control unit's request queue.

2. A-SUBT-QUEUE (C-A21). Read one request (subtract) from the controller's request queue.

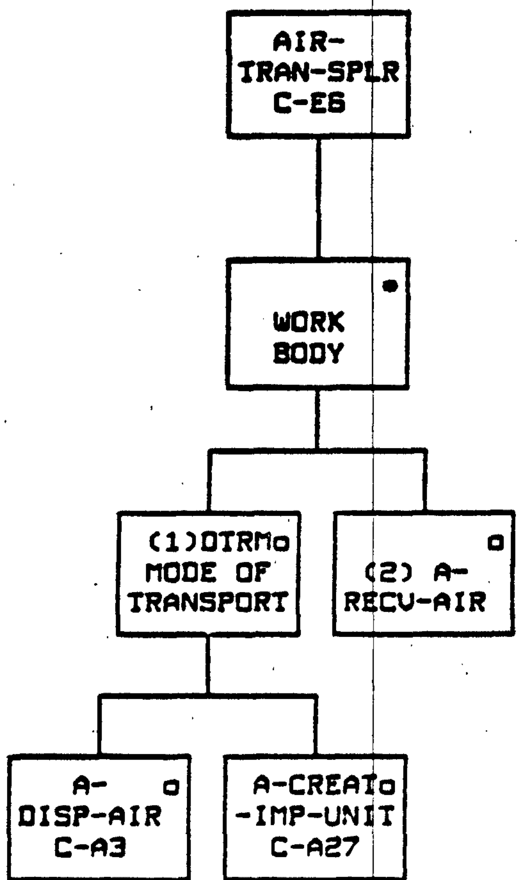

Figure C-6. Entity-action diagram for AIR-TRAN-SPLR

ENTITY-ACTION DESCRIPTION: AIR-TRANSP-SPLR (C-E6)

1. DETERMINE MODE OF TRANSPORT. This step corresponds directly to step 1 (CREATE CONVOY) of AIR-TRANSP-EX (C-E2). When the explicit air transport unit is created, subtract the aircraft from the transportation supplier (parent unit) using A-DISPATCH-AIRCRAFT (C-A3). When an implicit transport unit is needed, trigger A-CREATE-IMP-UNIT (C-A27) to create one.

2. A-RECEIVE-AIRCRAFT (C-A4). This action corresponds directly to step 12 of AIR-TRANSP-EX (C-E2). When the explicit air transport unit is deleted, add the aircraft back into the transportation supplier (parent unit).

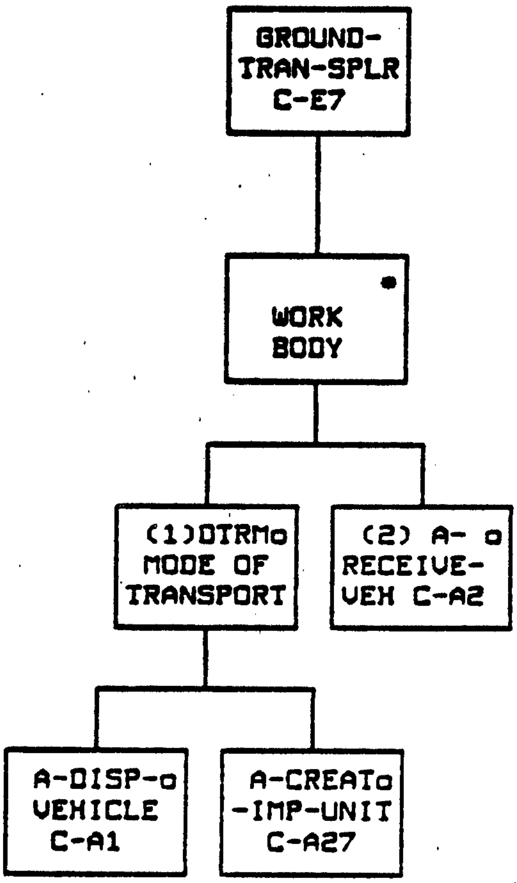

Figure C-7. Entity-action diagram for GROUND-TRAN-SPLR

ENTITY-ACTION DESCRIPTION: GND-TRANSP-SPLR (C-E7)

1. DETERMINE MODE OF TRANSPORT. This action corresponds directly to step 1 (CREATE CONVOY) of GND-TRANSP-EX (C-E1). When the explicit ground transport unit is created, subtract the vehicle from the transportation supplier (parent unit) using A-DISPATCH-VEHICLE (C-A1). When an implicit transport unit is needed, trigger A-CREATE-IMP-UNIT (C-A27) to create one.

2. A-RECEIVE-VEHICLE (C-A2). This action corresponds directly to step 13 of the GND-TRANSP-EX (C-E1). When the explicit transport unit is deleted, add the vehicle back into the transportation supplier (parent unit).

4. GENERATOR FUNCTION LIST.

C-F1 F-CREATE-RQST

SUMMARY: Can be called by any model functional area (e.g., supply, personnel replacement). A transportation task/request will be created if the request is greater than or equal to the minimum size allowed.

TRIGGERED BY: Any functional area requiring transportation support

RESULTING IN:

TRANSP-RQST	(C-E4)
A-CREATE-RQST	(C-A22)

C-F2 F-DIRECT-RQST

SUMMARY: Determines the transportation type and which control unit will receive the task/request in A-RECEIVE-RQST.

TRIGGERED BY:

F-TCONTROL	(C-F3)
Any functional area creating a transport request	

RESULTING IN:

TRANSP-RQST	(C-E4)
A-RECEIVE-RQST	(C-A23)
RQST-MANAGER	(C-E5)
A-ADD-QUEUE	(C-A20)

C-F3 F-TCONTROL

SUMMARY: Defines the priority of the request and the support type needed. If transportation support units are available, assign the request to the selected support unit(s); otherwise, either fill part and hold part on the queue or drop the request.

TRIGGERED BY: Transportation dispatcher

RESULTING IN:

TRANSP-RQST	(C-E4)
A-PART-FILL	(C-A24)
A-COMPLETE-FILL	(C-A25)
A-DROP-RQST	(C-A26)
A-FORWARD-RQST	(C-A16)
RQST-MANAGER	(C-E5)
A-ADD-QUEUE	(C-A20)
A-SUBT-QUEUE	(C-A21)

C-F7 F-GND-IMP-TRAVEL

SUMMARY: Computes an implicit movement delay time for a ground transporter.

TRIGGERED BY:	F-BEG-TRANSP-GND	(C-F5)	
RESULTING IN:	F-ATOBJ-GND	(C-F10)	Scheduled

C-F8 F-AIR-IMP-TRAVEL

SUMMARY: Computes an implicit movement delay time for an air transporter.

TRIGGERED BY:	F-BEG-TRANSP-AIR	(C-F6)	
RESULTING IN:	F-ATOBJ-AIR	(C-F11)	Scheduled

C-F9 F-REDIRECT

SUMMARY: Generates a new objective, defined by either a gamer or the model, for a transport unit while the unit is enroute.

TRIGGERED BY:	Movement module	Air module
	Gamer	
RESULTING IN:	GND-TRANSP-EX	(C-E1)
	AIR-TRANSP-EX	(C-E2)
	A-REDIRECT	(C-A8)

C-F10 F-ATOBJ-GND

SUMMARY: Determines what action to take after a ground transporter reaches its objective.

TRIGGERED BY:	Transportation dispatcher		
RESULTING IN:	GND-TRANSP-EX	(C-E1)	
	A-END-TRAVEL	(C-A6)	
	F-TRANSP-PM	(C-F12)	
	F-ARRIVE-SUPPLIER	(D-F12)	Supply
	F-ARRIVE-CUSTOMER	(D-F17)	Supply
	F-DISPER	(E-F3)	Personnel
	F-LOADPER	(E-F14)	Personnel

C-F4 F-TSUPPLIER

SUMMARY: Determines the available assets and dispatches the vehicles/aircraft to perform the requested task.

TRIGGERED BY: Transportation dispatcher

RESULTING IN:
RQST-MANAGER (C-E5)
  A-SUBT-QUEUE (C-A21)
GND-TRANSP-EX (C-E1)
GND-TRANSP-SPLR (C-E7)
  A-DISPATCH-VEHICLE (C-A1)
AIR-TRANSP-EX (C-E2)
AIR-TRANSP-SPLR (C-E6)
  A-DISPATCH-AIRCRAFT (C-A3)
TRANSP-RQST (C-E4)
  A-DROP-RQST (C-A26)
IMPLICIT-TRANSP (C-E3)
  A-CREATE-IMP-UNIT (C-A27)
F-CHINV (E-F4) Personnel Scheduler (to begin transport event)

C-F5 F-BEG-TRANSP-GND

SUMMARY: Defines the first objective and triggers movement for a ground transporter.

TRIGGERED BY: Transportation dispatcher

RESULTING IN:
GND-TRANSP-EX (C-E1)
  A-START-TRAVEL (C-A5)
  A-START-MOVE (C-A7)
F-GND-IMP-TRAVEL (C-F7)
Movement module

C-F6 F-BEG-TRANSP-AIR

SUMMARY: Defines the first objective and triggers movement for an air transporter.

TRIGGERED BY: Transportation dispatcher

RESULTING IN:
AIR-TRANSP-EX (C-E2)
  A-START-TRAVEL (C-A5)
  A-START-FLIGHT (C-A10)
F-AIR-IMP-TRAVEL (C-F8)
Air module

C-F11 F-ATOBJ-AIR

SUMMARY: Determines what to do after an air transporter reaches its objective.

TRIGGERED BY: Transportation dispatcher

RESULTING IN:

AIR-TRANSP-EX	(C-E2)	
A-END-TRAVEL	(C-A6)	
A-END-UNLOAD	(C-A12)	
F-TRANSP-PM	(C-F12)	
F-ARRIVE-SUPPLIER	(D-F12)	Supply
F-ARRIVE-CUSTOMER	(D-F17)	Supply
F-DISPER	(E-F3)	Personnel
F-LOADPER	(E-F14)	Personnel

C-F12 F-TRANSP-PM

SUMMARY: Computes a delay time to represent the time needed to perform maintenance on the transporter after it returns to its home unit.

TRIGGERED BY:

F-ATOBJ-GND	(C-F10)
F-ATOBJ-AIR	(C-F11)

RESULTING IN:

GND-TRANSP-EX	(C-E1)	
AIR-TRANSP-EX	(C-E2)	
A-BEGIN-PM	(C-A9)	
F-TRANSP-RETURN	(C-F17)	Scheduled

C-F13 F-SPLIT-CK

SUMMARY: Determines what action a ground transport unit should take when arriving at a supply point.

TRIGGERED BY F-TU-DECISION (D-F15) Supply

RESULTING IN:

GND-TRANSP-EX	(C-E1)
A-SPLIT	(C-A17)
A-DISPATCH-VEHICLE	(C-A1)
F-BEG-TRANSP-GND	(C-F5)

C-F14 F-SCHED-IMP-TRANSP

SUMMARY: Controls the movement of implicit transportation from parent to supplier to customer to parent.

TRIGGERED BY: Transportation dispatcher

RESULTING IN:

IMPLICIT TRANSP	C-E3)	
A-START-TRANSIT	(C-A18)	
A-END-IMP-UNIT	(C-A28)	Scheduled
A-IMP-LV-SPLR	(C-A19)	Scheduled
A-IMP-LV-CUSTOMER	(C-A15)	Scheduled

C-F15 F-TRANSP-DECIDE

SUMMARY: Determine what the transporter is to do in key situations.

TRIGGERED BY: Transportation dispatcher from:

F-DISPER	(E-F3)	Personnel
F-LOADPER	(E-F14)	Personnel
F-ARRIVE-SUPPLIER	(D-F12)	Supply
F-ARRIVE-CUSTOMER	(D-F17)	Supply

RESULTING IN:

GND-TRANSP-EX	(C-E1)	
A-RECEIVE-VEHICLE	(C-A2)	
AIR-TRANSP-EX	(C-E2)	
A-RECEIVE-AIRCRAFT	(C-A3)	
F-BEG-TRANSP-GND	(C-F5)	Scheduled
F-BEG-TRANSP-AIR	(C-F6)	Scheduled

C-F16 F-TRANSP-DECON

SUMMARY: Determines whether a ground transporter needs to go through decontamination while delivering commodities.

TRIGGERED BY:

F-TSUPPLIER	(C-F4)	
F-DONE-DECON	(G-F6)	Decon

RESULTING IN: The next objective or intermediate unit decon objective.

C-F17 F-TRANSP-RETURN

SUMMARY: Completes the mission and adds the temporary unit assets back into the parent.

TRIGGERED BY: Transportation dispatcher from:
F-TRANSP-PM (C-F12)

RESULTING IN:
AIR-TRANSP-EX (C-E2)
AIR-TRANSP-SPLR (C-E7)
A-RECEIVE-AIRCRAFT (C-A4)
GND-TRANSP-EX (C-E1)
GND-TRANSP-SPLR (C-E6)
A-RECEIVE-VEHICLE (C-A2)

APPENDIX C

Annex

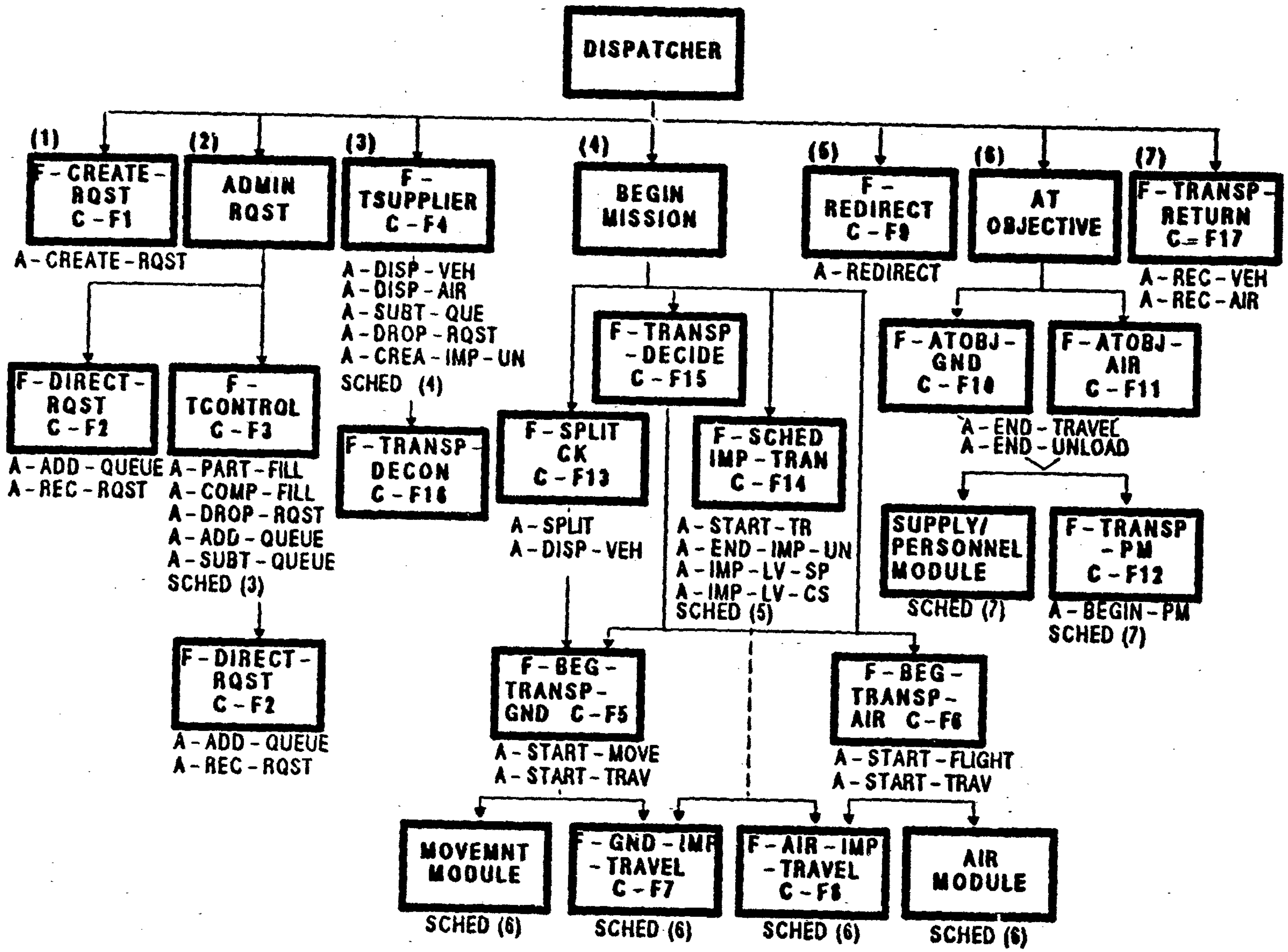

Figure C-8. Transportation dispatcher

C-F1 F-CREATE-RQST TYPE: Interactive Function

SUMMARY: This function can be called by any model functional area (e.g., supply, personnel replacement) seeking transportation. The request is evaluated and, if it is greater than or equal to the minimum size allowed, a transportation task/request will be created.

TRIGGERED BY: Any functional area that needs transportation support.

RESULTING IN: TRANSP-RQST (C-E4)
A-CREATE-RQST (C-A22)

SYSTEM SPECIFICATION DIAGRAM:

See figure C-9.

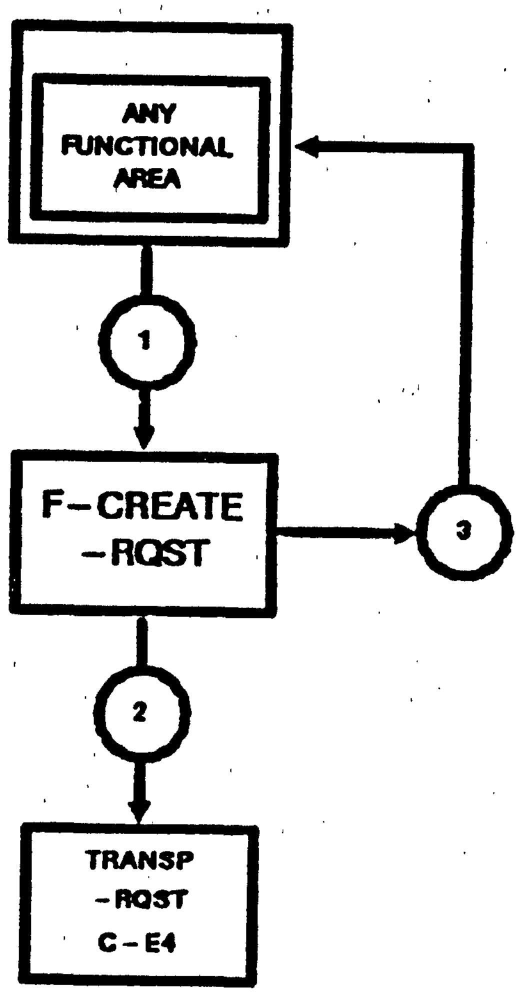

Figure C-9. F-CREATE-RQST SSD

DATA DEFINITION: F-CREATE-RQST

Connection Number	Data Transferred	Comments
D1	o Transportation request information	
	o Customer unit ID	Received from requestor.
	o Supplier unit ID	
	o Supply type	
	o Commodity type to be hauled	
	o Commodity quantity to be hauled	
	o Request type (normal, emergency, allocation)	
D2	o Transportation request information	
	o Request ID	Needed by A-CREATE-RQST.
	o Customer unit ID	
	o Supplier unit ID	
	o Supply type	
	o Commodity type to be hauled	
	o Commodity quantity to be hauled	
	o Request type (normal, emergency, allocation)	
D3	o Request flag	0 = no request created. 1 = request created.

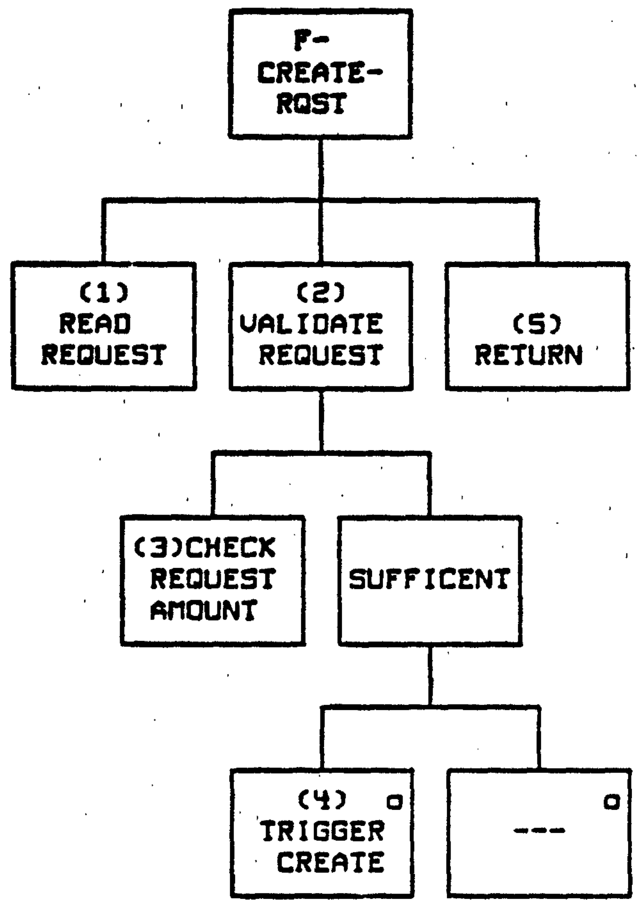

Figure C-10. F-CREATE-RQST generator

C-F1

GENERATOR DESCRIPTION: F-CREATE-RQST

1. READ REQUEST. Read file D1.

2. VALIDATE REQUEST. Make sure this is a valid request that can be processed.

3. CHECK REQUEST AMOUNT. Check to make sure the request is for a quantity that would require at least one vehicle (i.e., truck or aircraft) to transport the requested commodity. Requests for smaller amounts will not be processed. The amount of the commodity needed can accumulate at the requesting unit and be processed later.

4. TRIGGER CREATE. Trigger the action A-CREATE-RQST (C-A22) for TRANSP-RQST (C-E4). This creates one request that will be processed by F-DIRECT-RQST.

5. RETURN. Return to the calling module indicating whether the request was created.

C-F2 **F-DIRECT-RQST** TYPE: Interactive Function

SUMMARY: This function reads a file of transportation requests. It determines which transportation control unit will receive each request and triggers the A-ADD-QUEUE action to add the request to the controller's queue. Then, it establishes a support type and a task priority for the control unit selected.

Each functional area requiring transportation fills the request file by triggering the A-CREATE-RQST action. A transportation requester defines all requests for all units during a cycle before initiating this function. When this function is triggered, it processes all requests in the file.

TRIGGERED BY: F-TCONTROL (C-F3)
Any functional area that has created a request.

RESULTING IN:

TRANSP-RQST	(C-E4)
A-RECEIVE-RQST	(C-A23)
RQST-MANAGER	(C-E5)
A-ADD-QUEUE	(C-A20)

SYSTEM SPECIFICATION DIAGRAM:

See figure C-11.

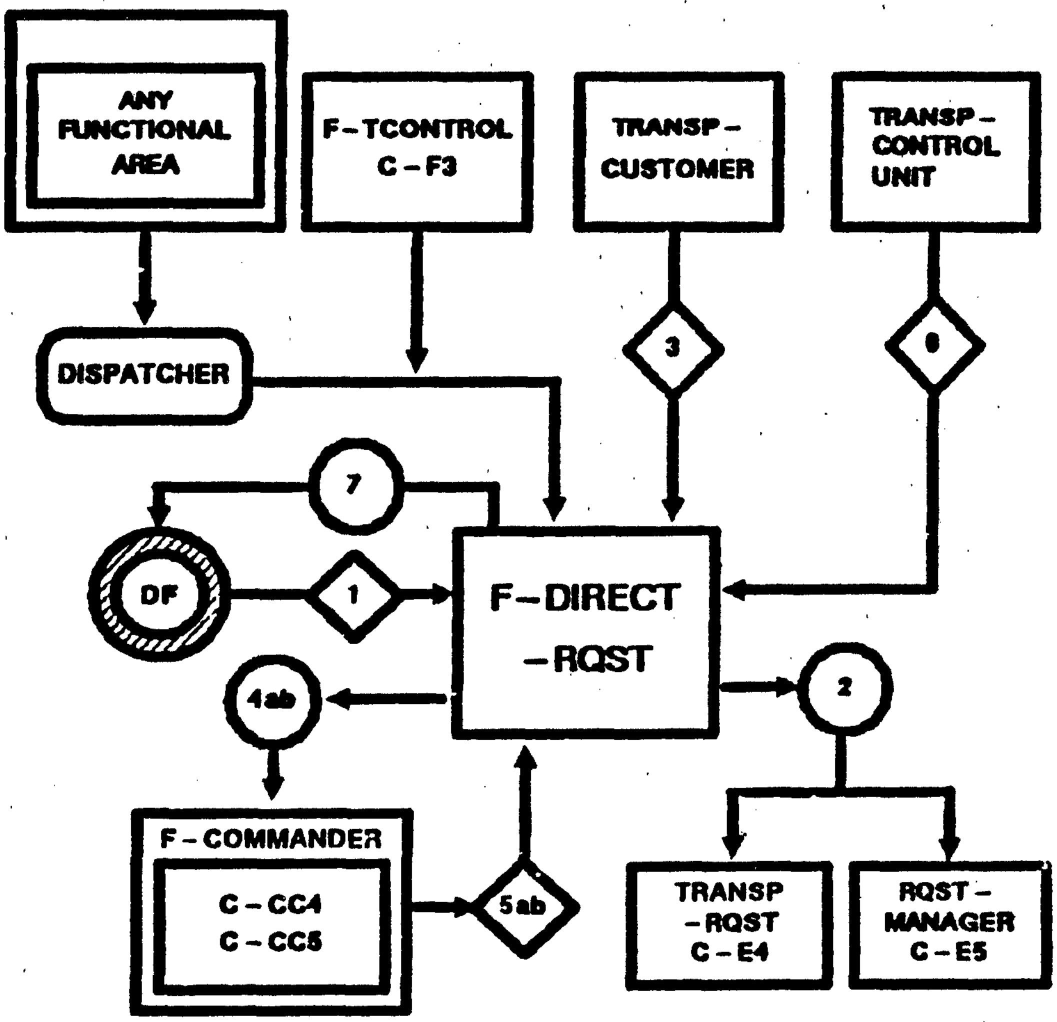

Figure C-11. F-DIRECT-RQST SSD

C-F2

DATA DEFINITION: F-DIRECT-RQST

Connection Number	Data Transferred	Comments
D1	o Request ID o Customer ID o Supplier ID o Supply type o Quantity to be hauled o Request type (normal, emergency, allocation) o Time in queue o Request owner	Transportation request.
D2	o Request ID o Control unit ID	Needed to trigger A-RECEIVE-RQST and A-ADD-QUEUE.
S3	o Customer echelon o Customer unit type o Customer mission o Customer unit supply indicator o Transportation control unit supporting this customer o Second control unit (optional)	Transportation control unit relationship (C-DF1).
D4a	o Customer unit type o Customer mission o Customer echelon o Customer supply indicator o Request type (normal, emergency, allocation) o Supply type o Supplier echelon	Used to determine request priority.
D4b	o Control unit echelon o Request priority o Commodity type	Used to determine support type.

C-F2

DATA DEFINITION: F-DIRECT-RQST (cont.)

Connection Number	Data Transferred	Comments
D5a	o Request priority data	Request priority (C-CC4).
D5b	o Support type and priority	Support type (C-CC5).
S6	o Transport control unit o Control unit echelon	The control unit supporting the control unit.
D7	o Controller Unit ID	Added to the controller list.

C-F2

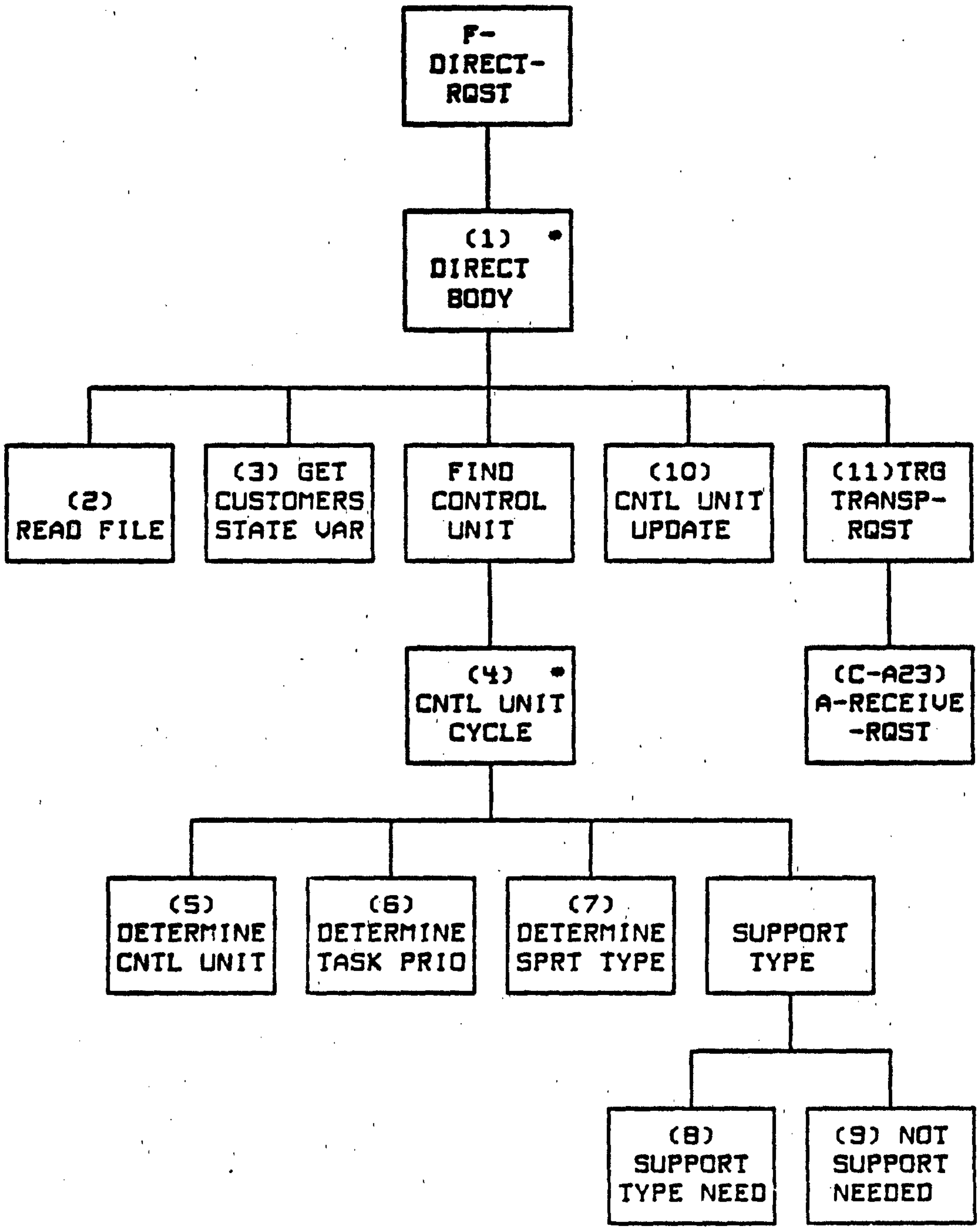

Figure C-12. F-DIRECT-RQST generator

GENERATOR DESCRIPTION: F-DIRECT-RQST

1. DIRECT BODY. Loop for every request on the file.

2. READ FILE. Read file D1.

3. GET CUSTOMER SV. Get the customer unit state vector (S3) using the customer unit ID passed in D1.

4. CONTROL UNIT CYCLE. Loop until a control unit with the proper available support type is found.

5. DETERMINE CONTROL UNIT. Every customer unit has a control unit to report to. (Note: A customer unit can be a control unit for itself. If a customer unit is its own control unit, an additional pointer is kept for the next control unit in the chain.) Each loop of the control unit cycle (step 4) progresses one control unit through the list. Determine the first control unit to be checked using S3. All subsequent control units to be checked are obtained from S6.

6. DETERMINE TASK PRIORITY. Using the customer read in D1, determine the priority of this task. The priority is a function of the following data elements (passed in C4a):

- o Request type (normal, emergency, allocation)
- o Supply type
- o Customer mission
- o Customer supply status (low, critical, etc.)
- o Customer type
- o Customer echelon
- o Controller echelon

These parameters are used to retrieve the priority from data file D5a using F-COMMANDER. Customer data is passed by S3.

7. DETERMINE SUPPORT TYPE. The support type is determined as a function of the following passed in D4b:

- o Request priority (determined using C-CC4)
- o Control unit echelon (S6)
- o Commodity to be transported

F-DIRECT-RQST (cont.)

7. (cont.) The support type is retrieved from data file D5b using F-COMMANDER. The choices are the following:

- o Rolling stock (self delivery)
- o Ground vehicle delivery
- o Air lift
- o Air drop

The data returned defines a priority for each of the support types. The control unit need not have the highest priority support types needed. The priority is used only when a control unit has more than one of the support types.

8. SUPPORT TYPE NEEDED. If the control unit selected has one of the support types necessary, exit the control unit cycle loop.

9. NOT SUPPORT NEEDED. If the control unit does not have the support type necessary, continue the loop with the next control unit.

10. CONTROL UNIT UPDATE. If the transportation control unit is not one that has been defined already in this cycle, add it to a list of control units receiving requests used by F-TCONTROL (D7). Trigger action A-ADD-QUEUE (C-A20) for RQST-MANAGER (C-E5) using D2.

11. TRIGGER TRANSP-RQST. Trigger action A-RECEIVE-RQST (C-A23) for TRANSP-RQST (C-E4) using D2 to define the control unit for the request.

C-F3 **F-TCONTROL** **TYPE: Interactive Function**

SUMMARY: This function models the tasks performed by the transportation controllers (e.g., the division transportation officer and movement control officer). When a task is received, a transportation supplier is selected. The task can be partly filled, completely filled, dropped, or forwarded to the next controller.

TRIGGERED BY: Transportation dispatcher

RESULTING IN:

TRANSP-RQST	(C-E4)
A-PART-FILL	(C-A24)
A-COMPLETE-FILL	(C-A25)
A-DROP-RQST	(C-A26)
A-FORWARD-RQST	(C-A16)
RQST-MANAGER	(C-E5)
A-ADD-QUEUE	(C-A20)
A-SUBT-QUEUE	(C-A21)

SYSTEM SPECIFICATION DIAGRAM:

See figure C-13.

C-F3

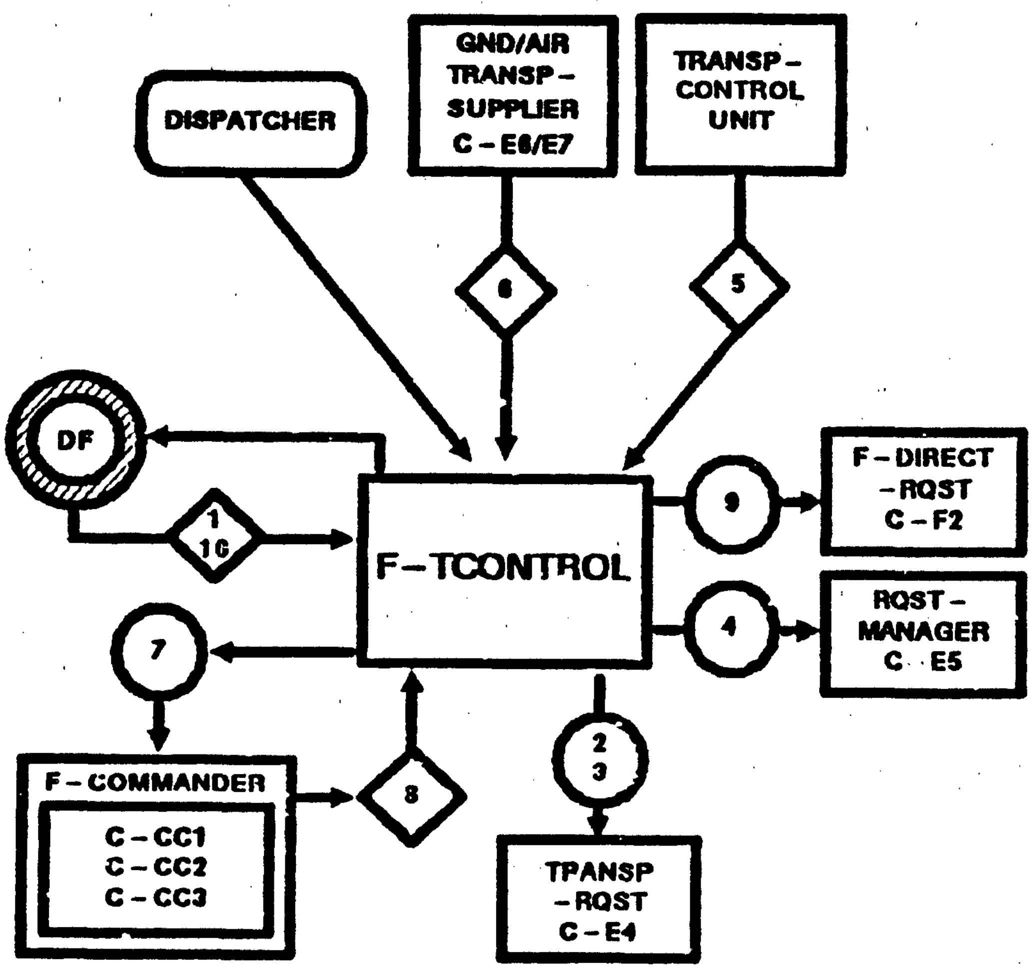

Figure C-13. F-TCONTROL SSD

DATA DEFINITION: F-TCONTROL

Connection Number	Data Transferred	Comments
D1a	o Controller list	
D1b	o Commodity to be hauled o Quantity to be hauled o Supplier ID o Customer ID o Request priority o Support type o Time on queue	Request file items.
D2a	o Commodity to be hauled o Quantity remaining	Written when a task is being partially filled.
D2b	o Request ID o Transportation supplier o Commodity type o Commodity quantity	Written to trigger A-COMPLETE-FILL.
D2c	o Customer unit ID o Supplier unit ID o Supply type o Commodity to be hauled o Commodity quantity o Request type	Written to trigger A-CREATE-RQST.
D2d	o Control unit ID o Request ID	Written to trigger A-RECEIVE-RQST.
D3a	o Request ID	Written to trigger A-DROP-RQST.
D3b	o Request ID o New control unit ID	Written to trigger A-FORWARD-RQST.
D4a	o Request ID o control unit ID	Written when an entry is added to the queue; triggers A-ADD-QUEUE.

C-F3

DATA DEFINITION: F-TCONTROL (cont.)

Connection Number	Data Transferred	Comments
D4b	o Request ID o Control unit ID	Written when an entry is removed from the queue; triggers A-SUBT-QUEUE.
S5	o Control unit echelon o Type of support provided (ground, airlift, airdrop)	Control unit data.
S6	o Type transport assets o Quantity transport assets	Transport supplier data.
D7a	o Request processor echelon o Request priority o Support type	Task processing (C-CC1).
D7b	o Echelon of control unit o Type of support	Support unit priority (C-CC2).
D7c	o Support type o Request priority o Transport supplier echelon	Task split (C-CC3).
D8a	o Request/task status flag	When the queue is checked, if the task is older than a cutoff time or if no support unit is available, determine what to do with the task (C-CC1).
D8b	o Support unit priority	When more than one support unit is available (C-CC2).
D8c	o Request/task split flag	When there is more than one support unit available and one alone cannot completely fill the task (C-CC3).

DATA DEFINITION: F-TCONTROL (cont.)

Connection Number	Data Transferred	Comments
D9	o Customer ID o Supplier ID o Supply type o Quantity to be hauled o Request type o Time in queue o Request ID o Request owner	Triggers F-DIRECT-RQST.
D10a	o Maximum request life	Maximum time allowable in queue (C-DF2).
D10b	o Hauling capacity	Transportation constant giving the hauling capacity for each transport type (C-DF3).
D10c	o Capacity needed	Transportation constant giving the capacity needed to hold each commodity (C-DF4).

C-F3

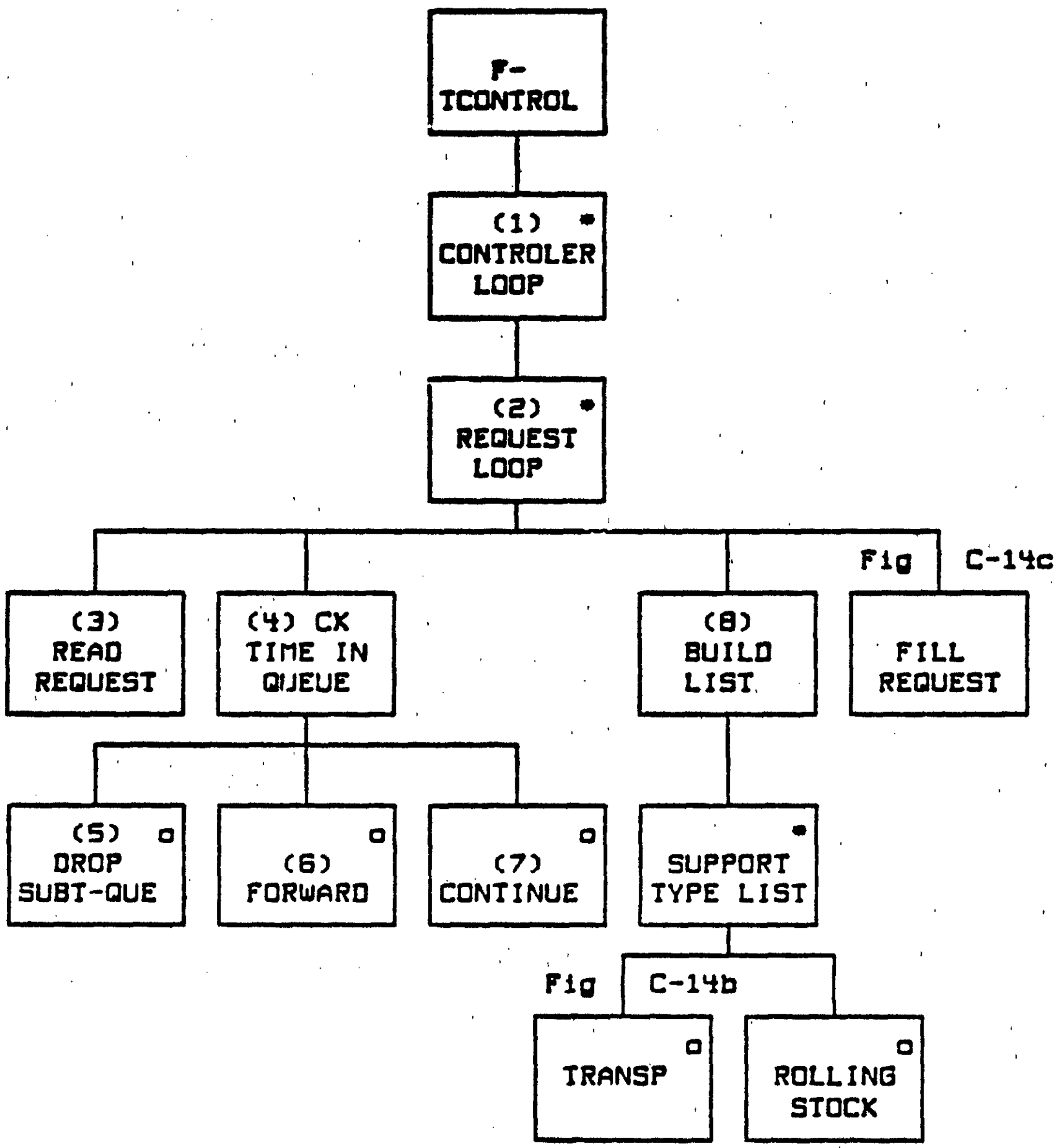

Figure C-14a. F-TCONTROL generator

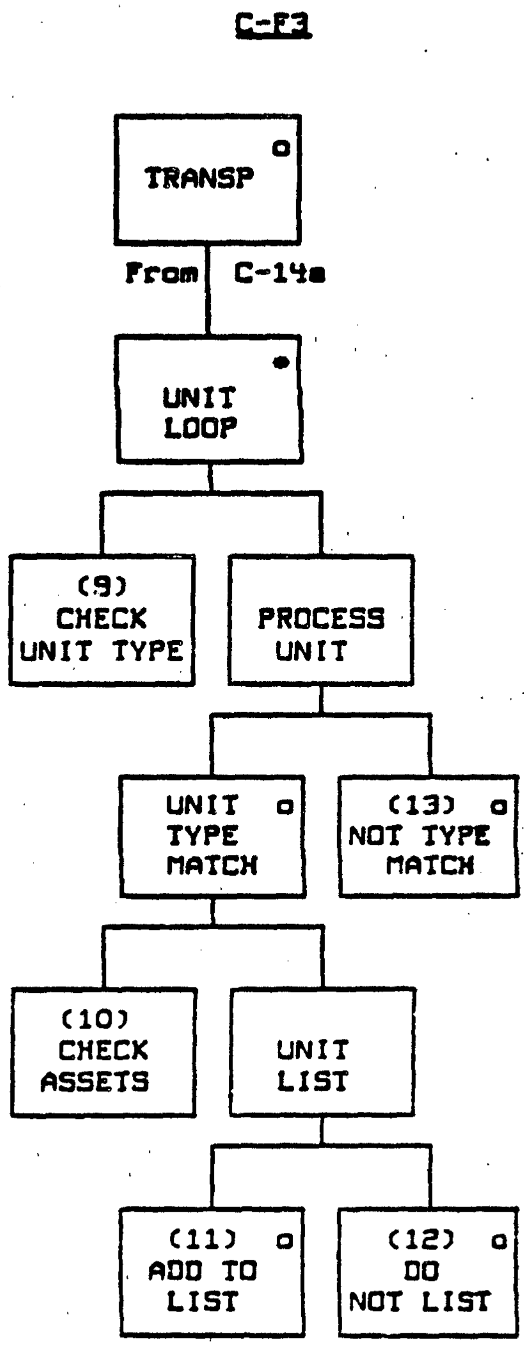

Figure C-14b. F-TCONTROL generator (continued)

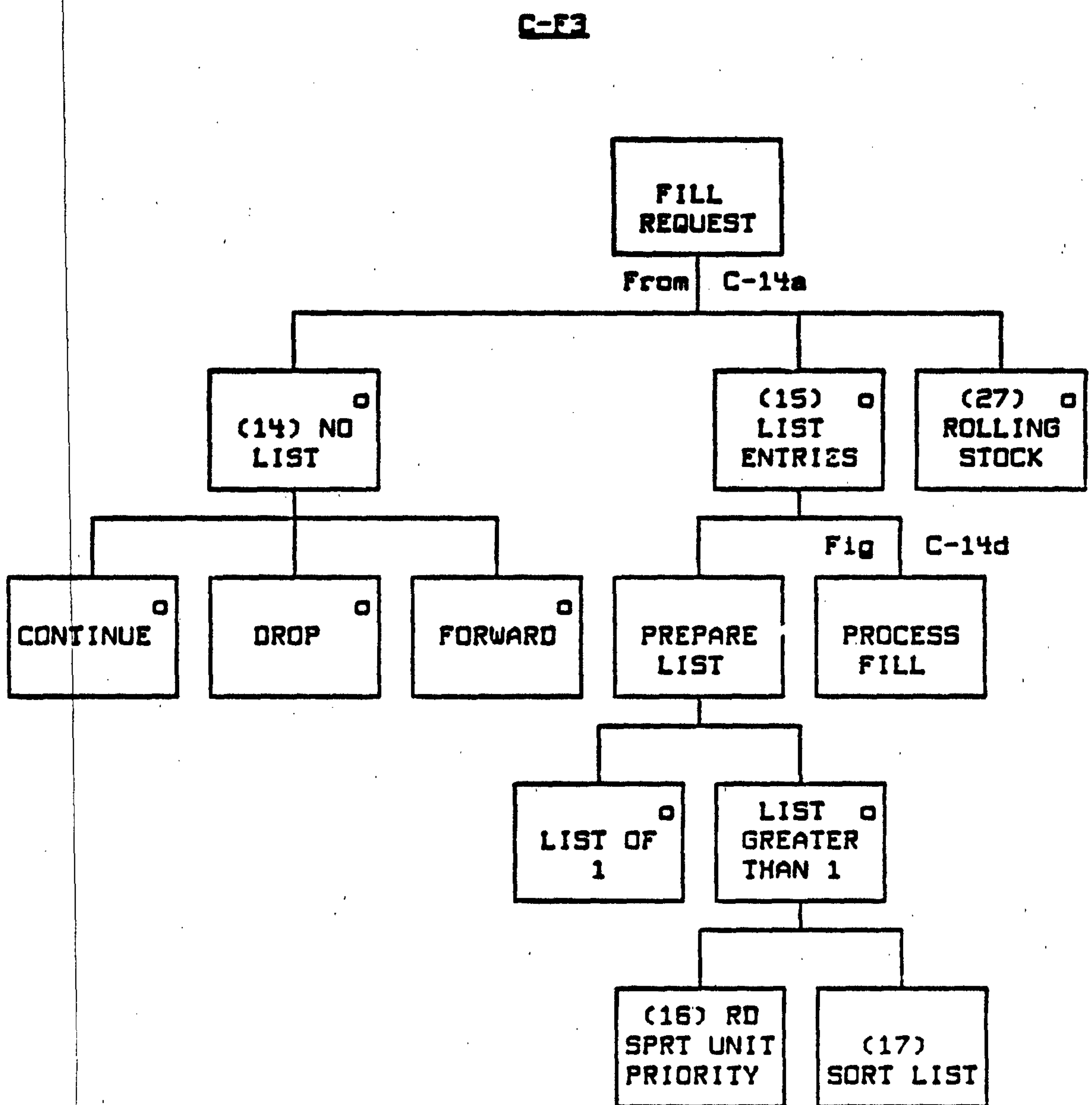

Figure C-14c. F-TCONTROL generator (continued)

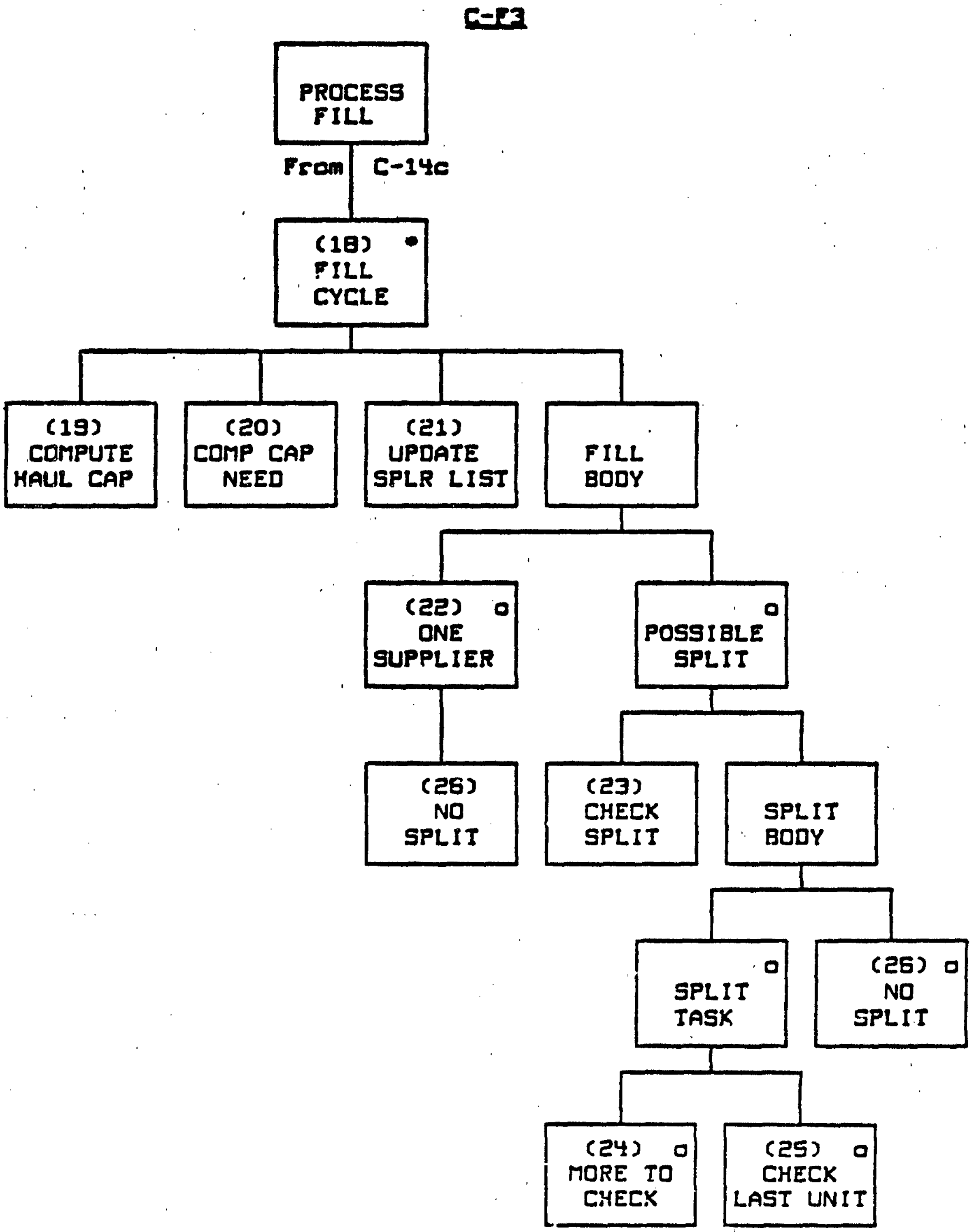

Figure C-14d. F-TCONTROL generator (continued).

C-F3

GENERATOR DESCRIPTION: F-TCONTROL

1. CONTROLLERS LOOP. Loop through all transportation controllers listed in D1a.

2. REQUEST LOOP. Loop through each request for each controller until all requests are processed or until all transportation supplier assets are in use.

3. READ REQUEST. Read the request from file D1b.

4. CHECK TIME IN QUEUE. Check the request road in step 3 to make sure it is current (D1b) by comparing it to the maximum request life (D10a). If the request's time in the queue has not exceeded the maximum time allowed, continue processing it. If the maximum time has elapsed, trigger F-COMMANDER with file D7a to determine what to do with the request. The response (i.e., drop, forward, continue) is returned in D8a.

5. DROP. If the decision is to drop the request, trigger the A-SUBT-QUEUE action for RQST-MANAGER (C-E5) with D4b. Trigger the A-DROP-RQST (C-A26) action for TRANSP-RQST (C-E4) with D3a.

6. FORWARD. If the decision is to forward the request, trigger function F-DIRECT-RQST (C-F2) to decide which transportation controller will receive it. Before this is done, put the request into the request file (D9) read by F-DIRECT-RQST and trigger A-SUBT-QUEUE for this request in this control unit. The output from F-DIRECT-RQST will trigger A-RECEIVE-RQST again which will lead to another call to F-TCONTROL. When F-TCONTROL is reactivated, the D1 file will be just like it was before the call except the request now being processed will have a new owner. Trigger A-FORWARD-RQST (C-A16) for TRANSP-RQST (C-E4) by D3b.

7. CONTINUE. The default decision is to continue processing the request.

8. BUILD LIST. Loop through the support type list in the assigned priority order (i.e., the order assigned in F-DIRECT-RQST). Check the highest priority first. If the request concerns rolling stock, it will not need support. Otherwise, each control unit has one or more support units in its command which can be checked as a possible supplier of transport assets.

9. CHECK UNIT TYPE. The type of support needed and therefore the unit type needed is defined in D1b. Continue the UNIT LOOP until a unit of the type needed for this request is found.

F-TCONTROL (cont.)

10. CHECK ASSETS. Each support unit should have a value for its total hauling capacity available. This haul capability is obtained from F-TSUPPLIER (C-F4) and kept in data file C-DF3. Check S6 to determine the asset type and determine if the unit has the assets available.

11. ADD UNIT TO LIST. Each unit that is found to have the support type necessary and have assets available to perform a task is put on a list.

12. DO NOT LIST. Do not list units that are not the support type needed or that do not have assets currently available.

13. NO TYPE MATCH. Continue the UNIT LOOP if the unit type does not match the type needed.

14. NO LIST. If there are no entries on the support unit list created in step 11, the request cannot now be processed. Trigger F-COMMANDER with D7a to determine what to do with the request. The possible responses are:

- o Forward the request to the next controller
- o Drop the request from the queue
- o Continue processing (i.e., leave the request on the queue and get out).

The response is passed back from F-COMMANDER in D8a and either step 4, 5, or 6 is repeated, depending upon the response.

15. LIST OF 1. No list processing is necessary if only one support unit is on the list.

16. READ SUPPORT UNIT PRIORITY. If more than one unit is on the list defined in step 11, trigger F-COMMANDER with D7b. D8b is returned to determine the criteria needed to select the support unit. This is a function of the unit echelon and support unit type.

17. SORT LIST. The units on the list should be sorted according to the criteria defined in step 16. The default, if no entry is in 16, is the support unit closest to the supply point or pickup point.

18. FILL CYCLE. Loop for each unit on the list or until the task is assigned.

19. COMPUTE HAULING CAPACITY. Determine how many assets are available in the unit being checked using assets passed in S6. Get the hauling capacity of each vehicle/aircraft from D10b. Compute the total hauling capability of the unit. Compute both the volume capacity and the weight capacity.

F-TCONTROL (cont.)

20. COMPUTE CAPACITY NEEDED. Determine the hauling capacity needed to transport the type and quantity of commodity specified in D1b. Get the volume and weight of each commodity from D10c.

NOTE: The computations in steps 19 and 20 above are the same as those in steps 9 and 10 in F-TSUPPLIER (C-F4). This would be a good place to use a common routine.

21. UPDATE SUPPLIER LIST. A list of transportation suppliers is built to be passed to F-TSUPPLIER. If the transportation supplier just selected is not on this list, add it.

22. ONE SUPPLIER. If the unit being checked can fill the request or there is only one unit on the list, perform step 26.

23. CHECK SPLIT. Trigger F-COMMANDER file using D7c to determine whether the remainder of the task is to be completed by the first unit selected or if the task is to be split. The response is in D8c.

24. MORE TO CHECK. If a split is to occur and there are more units to check:

- o Trigger A-CREATE-RQST for the split portion of the request with D2c.
- o Trigger A-PART-FILL (D2a). Subtract the amount that can be filled by the unit from the task amount giving a new task amount.
- o Trigger A-ADD-QUEUE (D4a) for the transportation supplier queue adding the task with the amount that can be filled.
- o Trigger A-RECEIVE-RQST using D2d. This is so the request is received at the transportation supplier.
- o Add the transportation supplier to the list of units receiving requests this cycle.

NOTE: An implementation decision must be made here. For CORDIVEM, this list is used by a dispatcher to loop through all suppliers. If more resolution is desired, schedule F-TSUPPLIER (C-F4) here. If an event is scheduled, use D10a to determine delay time.

F-TCONTROL (cont.)

25. CHECK LAST UNIT. If a split is to occur and there are no more units to check:

- o Trigger A-ADD-QUEUE (D4a) for the transportation supplier selected. This will add the remaining task to the queue.
- o Add the transportation supplier to the list of units receiving requests during this cycle. (See note in step 24.)
- o Trigger A-SUBT-QUEUE (D4b) to subtract the task from the controller unit queue.
- o Trigger A-COMPLETE-FILL (D2b) to move the entire amount remaining to be filled in this task to the transportation supplier task.

26. NO SPLIT. If the task is not to be split:

- o Trigger A-ADD-QUEUE (D4a) for the transportation supplier selected. This will add the entire task to its task queue.
- o Add the transportation supplier to the list of units receiving requests this cycle. (See note in step 24.)
- o Trigger A-SUBT-QUEUE (D4b) for the transportation control unit.
- o Trigger A-COMPLETE-FILL (D2b) to move the entire amount to be filled in this task to the transportation supplier task.

27. ROLLING STOCK. If the selected mode of transportation is rolling stock:

- o Trigger A-ADD-QUEUE (D4a) for the transportation supplier selected. This will add the entire task to its task queue.
- o Add the transportation supplier to the list of units receiving requests during this cycle. (See note in 24.)
- o Trigger A-SUBT-QUEUE (D4b) for the transportation control unit.
- o Trigger A-COMPLETE-FILL (D2) to move the entire amount to be filled for this task to the transportation supplier task.

C-F4 F-TSUPPLIER TYPE: Interactive Function

SUMMARY: This function models the task performed by any unit on the battlefield with transportation assets. It determines what assets are available and dispatches the transporter. The function can be triggered in two ways:

1. By a control unit when a request has been put into the transportation unit queue (F-TCONTROL).

2. By the transporter unit when it returns to the parent unit and is ready for another mission.

TRIGGERED BY: Transportation dispatcher

RESULTING IN:

ROST-MANAGER	(C-E5)	
A-SUBT-QUEUE	(C-A21)	
TRANSP-ROST	(C-E4)	
A-DROP-ROST	(C-A26)	
GND-TRANSP-EX	(C-E1)	
GND-TRANSP-SPLR	(C-E7)	
A-DISPATCH-VEHICLE	(C-A1)	
AIR-TRANSP-EX	(C-E2)	
AIR-TRANSP-SPLR	(C-E6)	
A-DISPATCH-AIRCRAFT	(C-A3)	
IMPLICIT-TRANSP	(C-E3)	
A-CREATE-IMP-UNIT	(C-A27)	
F-CHINV	(E-F4)	Personnel
Scheduler	(to begin transport event)	

SYSTEM SPECIFICATION DIAGRAM:

See figure C-15.

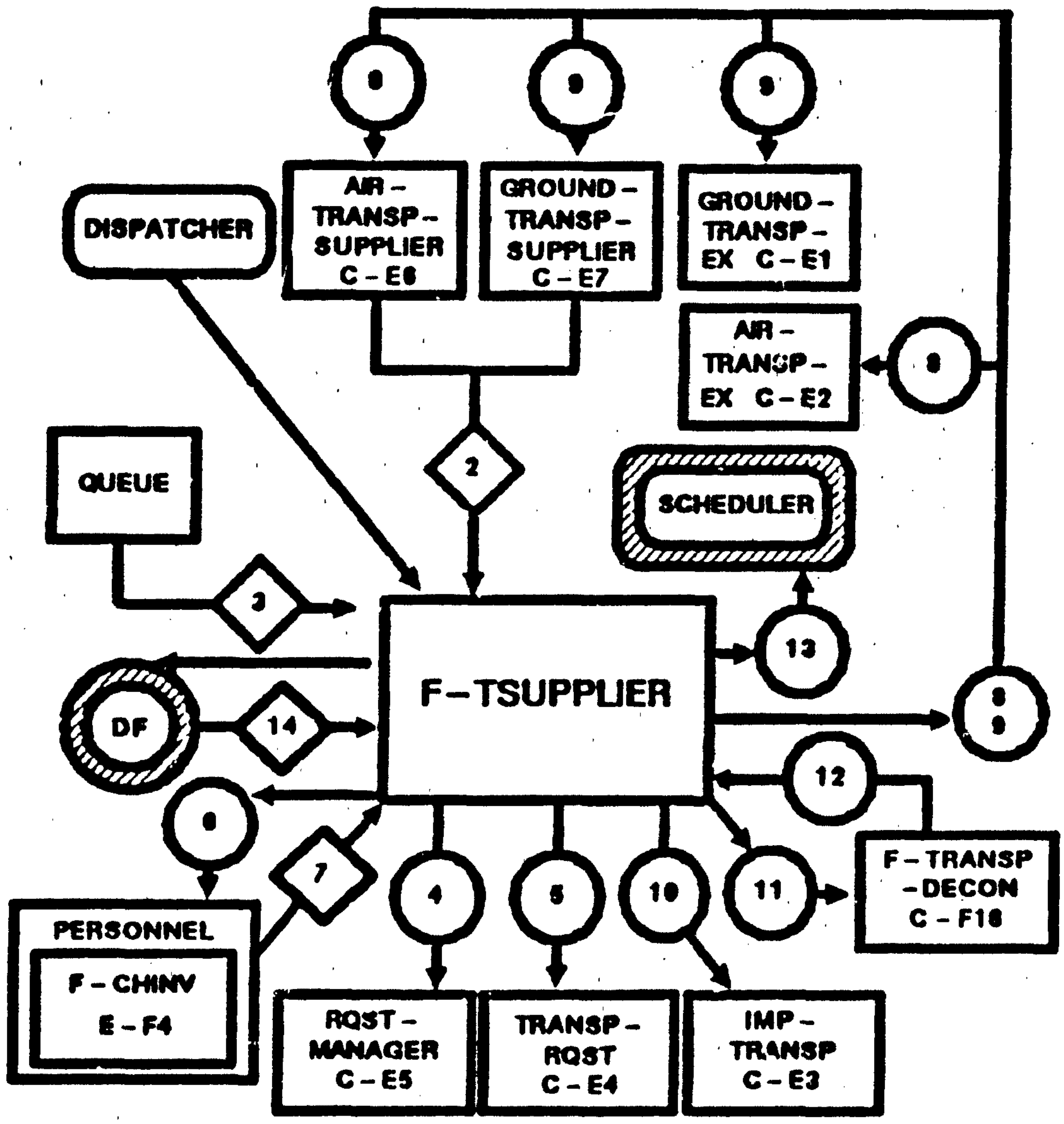

Figure C-15. F-TSUPPLIER SSD

DATA DEFINITION: F-TSUPPLIER

Connection Number	Data Transferred	Comment
D1	o Unit ID o Support type needed	Needed when a request is added to a transport supporter.
D2	o Unit ID o Support type available	Needed when a transport unit returns from a mission.
D3	o Request ID o Transport supplier ID o Customer unit ID o Supply unit ID o Supply type o Commodity to be hauled o Commodity quantity to be hauled o Request type o Time put into queue	Request queue.
D4	o Transportation request ID o Transport supplier ID	Trigger A-SUBT-QUEUE.
D5	o Customer unit ID o Indicator	Trigger A-COMPLETE-FILL.
D6	o Unit ID o Equipment to be used	Determine whether a unit has personnel to man the systems.
D7	o Equipment to be manned o Personnel to be used	
D8	o AIR-TRANSP-EX ID o Objective unit ID o Flag indicating implicit or explicit travel	
D9	o Transport ID o Objective unit ID o Flag indicating implicit or explicit travel o Objective save	Trigger A-DISPATCH-VEHICLE.

DATA DEFINITION: F-TSUPPLIER (cont.)

Connection Number	Data Transferred	Comment
D10	o Transportation supplier ID o Supplier ID o Customer ID	Create an implicit unit.
D11	o Transporter ID o Objective unit ID o Current unit ID	Trigger F-TRANSP-DECON.
D12	o Objective unit ID o Objective save unit ID	Returned from function F-TRANSP-DECON.
D13	o Delay time o Transport unit ID o Objective unit ID o Type of move	Sent to scheduler.
D14a	o Maximum request life	Maximum length of time a request should remain on the queue (C-DF2).
D14b	o Hauling capacity	Hauling capacity data for each vehicle type (C-DF3).
D14c	o Mode of transportation	Implicit or explicit travel type (C-DF5).
D14d	o Commodity capacity	Transportation constant (C-DF4).
D14e	o Supplier decision time	TSUPPLIER C2 time (C-DF11).
D14f	o Control decision time	Controller C2 time (C-DF12).

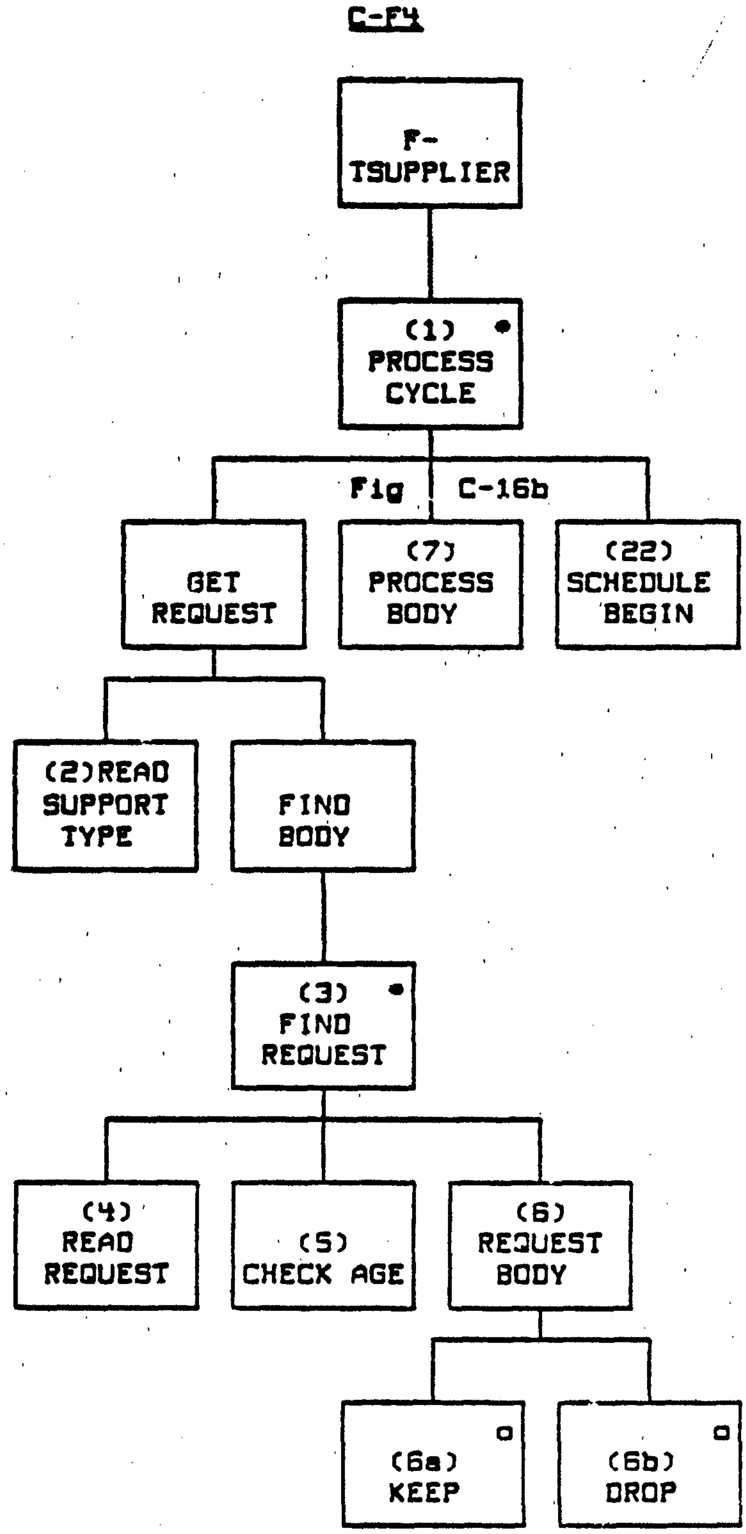

Figure C-16a. F-TSUPPLIER generator

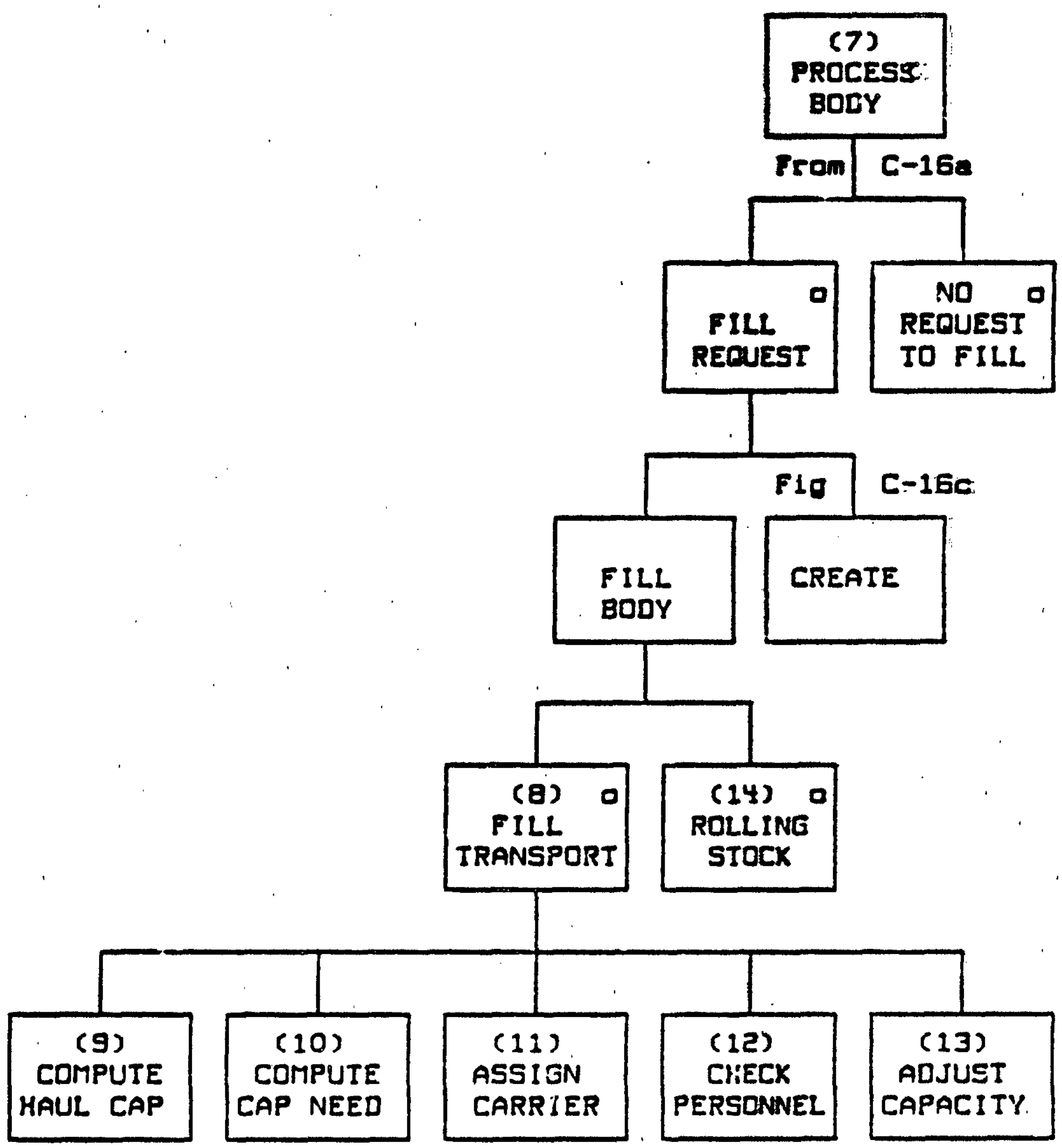

Figure C-16b. F-TSUPPLIER generator (continued).

C-F4

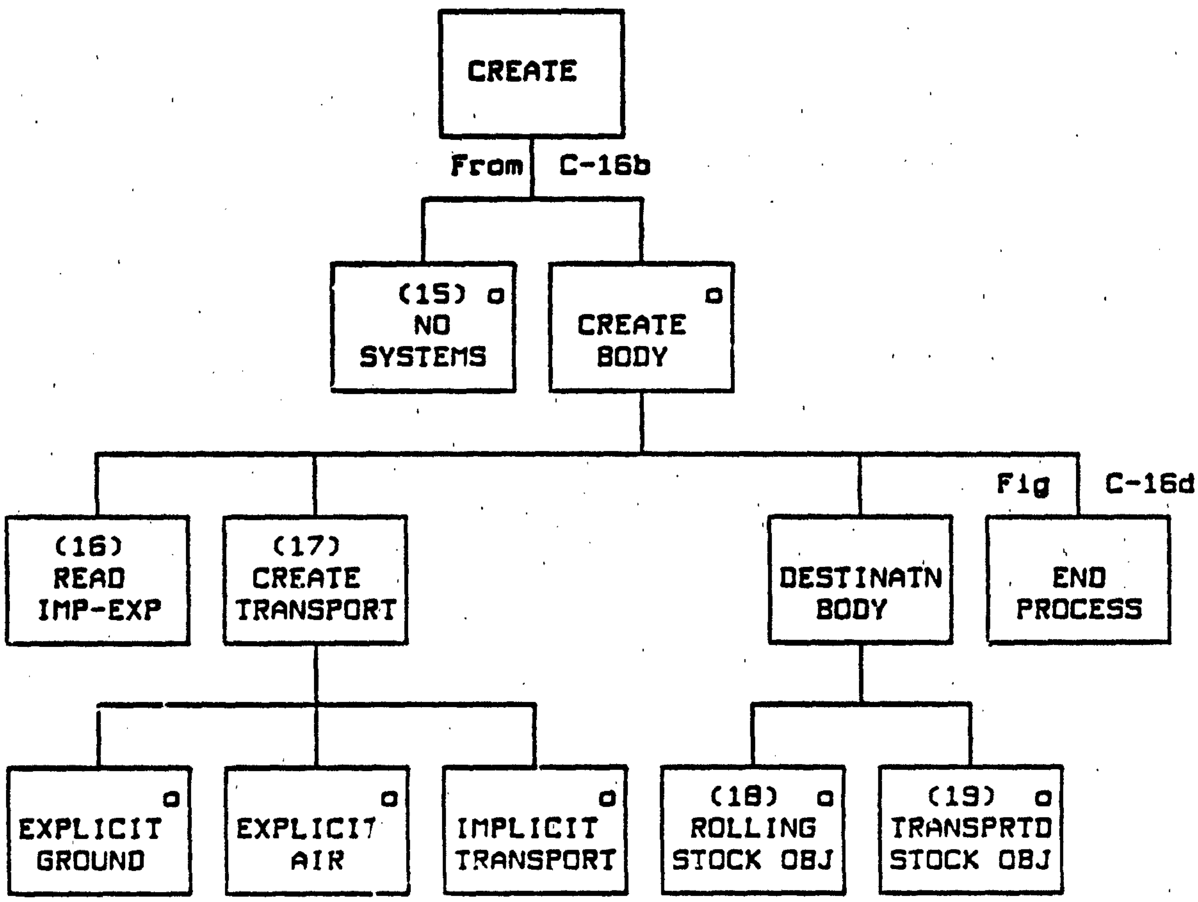

Figure C-16c. F-TSUPPLIER generator (continued)

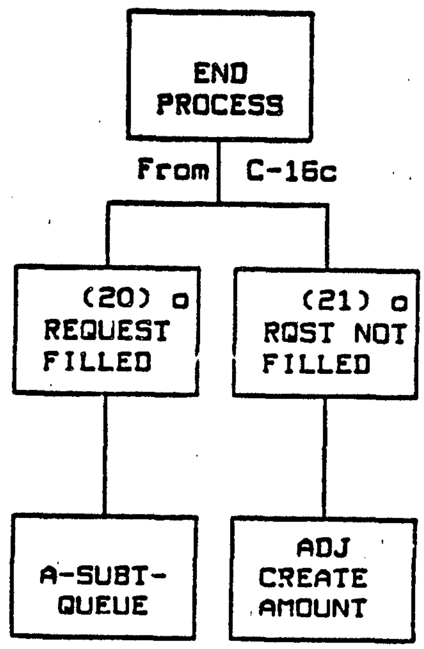

Figure C-16d. F-TSUPPLIER generator (continued)

C-F4

GENERATOR DESCRIPTION: F-TSUPPLIER

1. PROCESS CYCLE. Loop until either there are no more transportation assets to fill requests or there are no more requests to fill.

2. READ SUPPORT TYPE. Read the support type (D1 or D2). If the function was triggered because of a new request, the support type is the requested support type. If it was triggered because some assets have become available, the support type is the asset type now available in the transportation supplier unit.

3. FIND RQST. Loop until a current request is found or until no more requests are found requiring the support type available.

4. READ REQUEST. Read a request from the request queue (D3) for the transportation supplier being processed. The request should be the first one needing the support type defined in step 1. The queue is loaded so that the highest priority request will be read first.

5. CHECK AGE. Obtain the maximum time a request should remain on a queue by accessing D14a. The time is a function of both the support type and the echelon. If the request has been on the queue longer than the maximum allowable time, the request should not be filled.

6. REQUEST BODY. Determine if the request should be filled or dropped.

   a. KEEP. If the request has been on the queue less than the maximum time, get out of the FIND-RQST loop.

   b. DROP. If the request has been on the queue longer than the maximum time, it must be dropped. Initiate the A-DROP-RQST (C-A2b) action for TRANSP-RQST (C-E4) using D5. Initiate the A-SUBT-QUEUE (C-A2) action for RQST-MANAGER (C-E5) using D4.

7. PROCESS BODY. Check to see if there is a request to be filled. If so, continue with step 8. If no request has been found that can be filled by the available support, exit the process cycle loop (step 1).

8. FILL TRANSPORT. If the commodity is to be transported by a vehicle, process steps 9 through 13.

9. COMPUTE HAULING CAPACITY. The support type was defined in step 1. Get the number of vehicles of this type in the unit being processed. Get the hauling capacity of each vehicle type in the unit from file D14b. Compute both the volume capacity and the weight capacity.

F-TSUPPLIER (cont.)

10. COMPUTE CAPACITY NEEDED. Determine the hauling capacity needed to transport the type and quantity of commodity specified in D3. Get the volume weight of each commodity from D14d.

NOTE: The computation in steps 9 and 10 are the same as in steps 19 and 20 in F-TCONTROL. This is a good place for a call to a common routine.

11. ASSIGN CARRIERS. Determine which carriers will be assigned to the mission by the following process. Largest carriers are filled first.

a. Divide the capacity of the largest carrier into the required amount to be hauled.

b. Use the resulting whole number to determine the number of carriers of that size desired.

c. Compare the number of the carrier type desired (defined in step 11b) with the number available at the unit and select the lower value to define NUMBER-OF-THIS-CARRIER-TYPE.

d. Multiply the NUMBER-OF-THIS-CARRIER-TYPE by its capacity and add the result to TOTAL-ALLOCATED.

e. Subtract TOTAL-ALLOCATED from required amount to be hauled to obtain the AMOUNT-REMAINING to be hauled.

f. Divide the capacity of the next largest carrier into the AMOUNT-REMAINING.

g. Repeat steps 11b through 11e until the AMOUNT-REMAINING equals zero or until no more carrier types remain to be checked.

h. If AMOUNT-REMAINING is not equal to zero when all carrier types have been checked, assign one additional of the smallest carriers to the mission. The TOTAL-ALLOCATED is the capacity of the transporter.

12. CHECK PERSONNEL. Pass the unit identification code and the carrier types to be used (D6) to the personnel operations module (see F-CHINV (E-F4) in appendix E) in order to determine the unit's current capability to man the carriers. The number of each personnel type is received from this module (D7). If all carriers are not manned, receive the number of each vehicle type that is manned.

F-TSUPPLIER (cont.)

13. ADJUST CAPACITY. If the number of vehicles in the temporary unit that can be manned is not equal to the vehicles computed in step 10, recompute the total capacity of the temporary unit. Multiply the capacity of each vehicle type in the temporary unit that cannot be manned by the number of each type. Subtract this accumulated total that cannot be manned from TOTAL-ALLOCATED to give the new capacity of the unit.

14. ROLLING STOCK. If the commodity can move by its own power and rolling stock is the transportation mode selected, the total allocation can move in the convoy without additional support.

15. NO SYSTEMS. If there are no systems or equipment, get out.

16. READ IMP-EXP. Read D14c to determine whether to create an implicit unit or an explicit unit.

17. CREATE TRANSP. Perform one of the following procedures:

- o Create an explicit temporary ground unit (D9). Call the routine in the host model that creates temporary ground units. This develops the structure. Trigger the A-DISPATCH-VEHICLE (C-A1) action for GND-TRANSP-EX and GND-TRANSP-SPLR.

- o Create an explicit temporary air unit (D8). Call the routine in the host model that creates temporary air units. Trigger the A-DISPATCH-AIRCRAFT (C-A3) action for AIR-TRANSP-EX and AIR-TRANSP-SPLR.

- o Create a record for an implicit transport unit (D10). Define a temporary location to save the unit information. This is not an entire unit record for explicit use on the battlefield. Trigger A-CREATE-IMP-UNIT (C-A27) for IMPLICIT-TRANSP.

18. ROLLING STOCK OBJECTIVE. Define the rolling stock (RS) objective unit. The commodity supply point (e.g., supply point for major end items) is the transportation supplier for rolling stock. Set the objective unit ID (D11) to the customer unit ID (D3) and current unit ID (D11) to the supply unit ID (D3). Trigger function F-TRANSP-DECON (C-F16) with D11. This function will adjust the objective if decontamination is a consideration either at the current unit or at the objective unit. The adjusted objectives are returned in D12.

F-TSUPPLIER (cont.)

19. TRANSPORTED STOCK OBJECTIVE. Define the transported stock objective unit. Set the objective unit ID (D11) to the supply unit ID (D3). Set the current unit ID (D11) to the transportation supplier. Trigger function F-TRANSP-DECON (C-F16) with D11. The adjusted objectives ae returned in D12.

20. REQUEST FILLED. If the capacity of the temporary unit is equal to the desired amount, trigger A-SUBT-QUEUE (D4) to take the request off the queue (in this case, because the request has been filled).

21. REQUEST NOT FILLED. If the temporary unit does not fill the request, subtract the amount carried by the temporary unit from the desired amount on the queue. Leave the request on the queue so it will be number one priority next time assets are available.

22. SCHEDULE BEGIN. Schedule the event that triggers the beginning of a transporter. This is done by a call to the scheduler with D13, transportation event 4. Compute a delay time for the scheduler to account for the decision making and administrative time. If F-TSUPPLIER was triggered by a scheduled event, the delay time is obtained from D14e. If it is triggered by a call, the delay time is obtained by adding D14e and D14f together.

C-F5 F-BEG-TRANSP-GND TYPE: Interactive Function

SUMMARY: This function is triggered after F-TSUPPLY has created a temporary unit to fill a request or after F-TRANSP-DECIDE has defined the next objective for an explicit ground transportation unit. If defines the first object for the transporter and triggers the movement process.

TRIGGERED BY: Transportation dispatcher

RESULTING IN:

F-GND-IMP-TRAVEL	(C-F7)
GND-TRANSP-EX	(C-E1)
A-START-MOVE	(C-A7)
A-START-TRAVEL	(C-A5)
Movement module	

SYSTEM SPECIFICATION DIAGRAM:

See figure C-17.

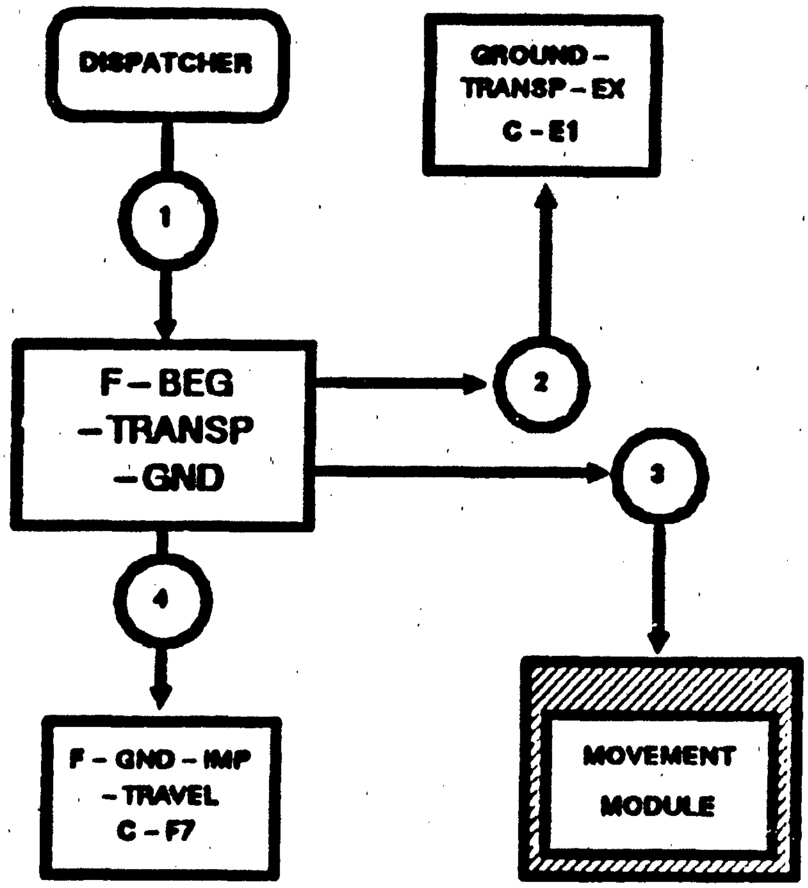

Figure C-17. F-BEG-TRANSP-GND SSD

DATA DEFINITION: F-BEG-TRANSP-GND

Connection Number	Data Transferred	Comments
D1	o Unit ID o Objective unit ID o Type of move	Initiates the function. Explicit or implicit.
D2a	o Transporter objective	
D2b	o Transport unit ID o Unit objective	Triggers implicit travel (A-START-MOVE or A-START-TRAVEL).
D3	o Transport unit ID	Triggers the movement module.
D4	o Transport unit ID	Triggers F-GND-IMP-TRAVEL.

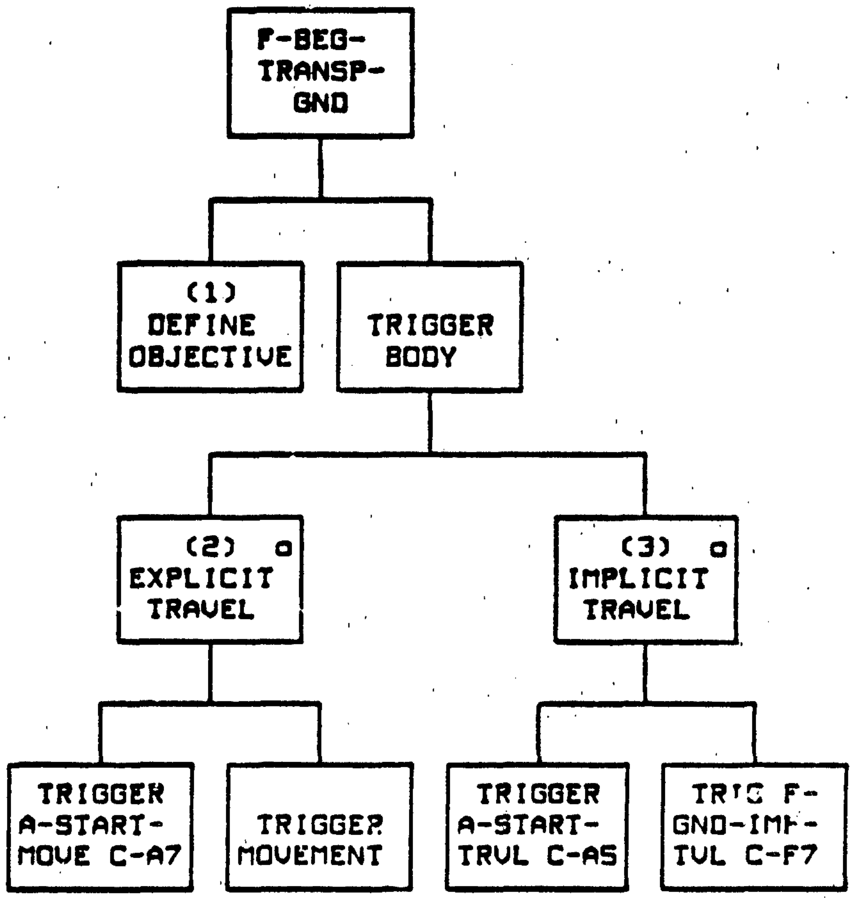

Figure C-18. F-BEG-TRANSP-GND generator

GENERATOR DESCRIPTION: F-BEG-TRANSP-GND

1. DEFINE OBJECTIVE. Define the ground transportation unit objective. Set the transporter objective (D2a) equal to the current location of the objective unit on D1.

2. EXPLICIT TRAVEL. If the travel mode is explicit, define the objective and trigger the A-START-MOVE action in GND-TRANSP-EX using D2. Pass control of the transporter (D3) to the movement module where routes and speed will be computed.

3. IMPLICIT TRAVEL. If the travel mode is implicit, trigger the A-START-TRAVEL action (D2b) for GND-TRANSP-EX. Trigger the function F-GND-IMP-TRAVEL using D4. This will compute the delay time needed to simulate the move.

C-F6 F-BEG-TRANSP-AIR **TYPE: Interactive Function**

SUMMARY: This function is triggered after F-TSUPPLY has created a temporary unit to fill a request or after F-TRANSP-DECIDE has defined the next objective for a transporter. It defines the objective for an explicit air transportation unit and triggers the flight process.

TRIGGERED BY: Transportation dispatcher

RESULTING IN:

F-AIR-IMP-TRAVEL	(C-F8)
AIR-TRANSP-EX	(C-E2)
A-START-FLIGHT	(C-A10)
A-START-TRAVEL	(C-A5)
Air module	

SYSTEM SPECIFICATION DIAGRAM:

See figure C-19.

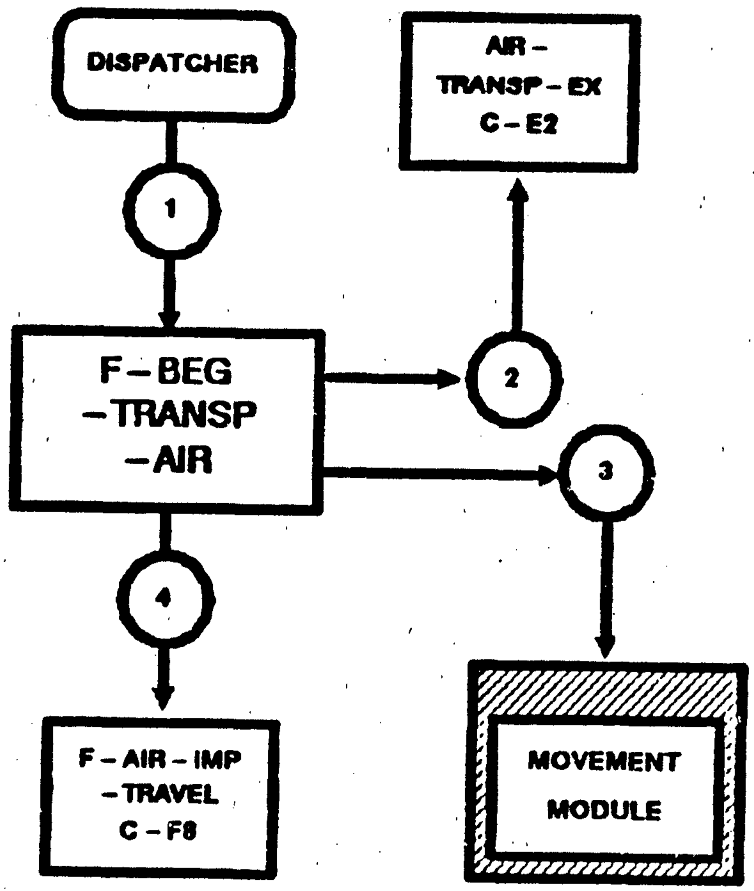

Figure C-19. F-BEG-TRANSP-AIR SSD

DATA DEFINITION: F-BEG-TRANSP-AIR

Connection Number	Data Transferred	Comments
D1	o Unit ID o Objective unit ID o Type of move	Initiates the function. Explicit or implicit.
D2a	o Transporter objective	
D2b	o Transport unit ID o Unit objective	Triggers implicit travel.
D3	o Transport unit ID	Triggers the air module.
D4	o Air unit ID	Triggers F-AIR-IMP-TRAVEL.

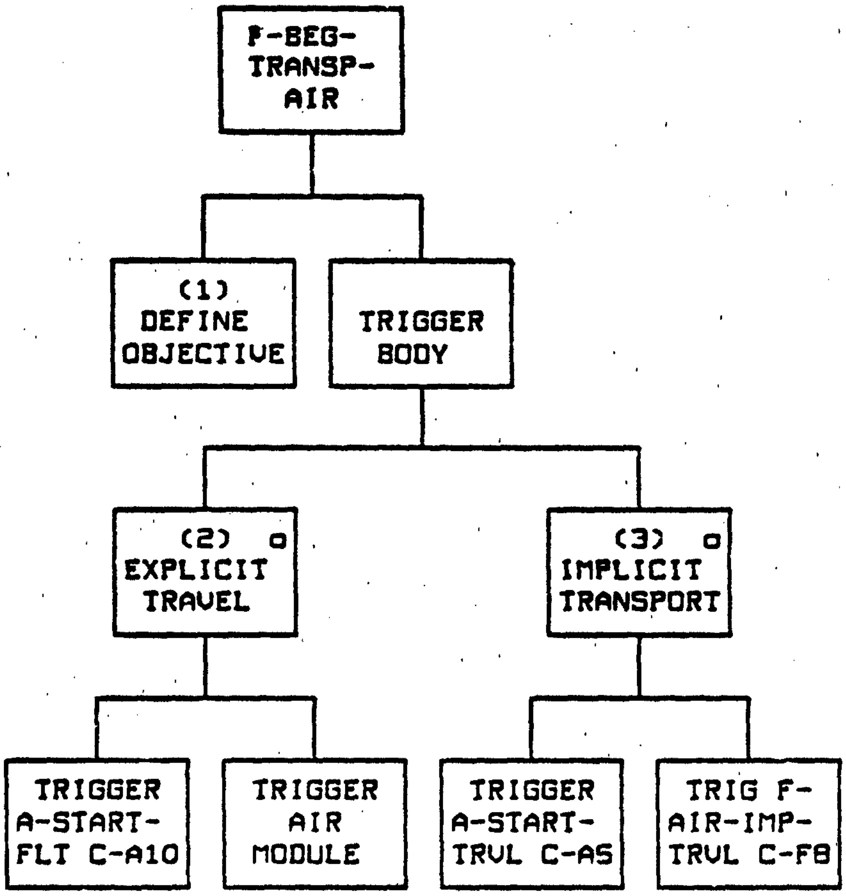

Figure C-20. F-BEG-TRANSP-AIR generator

C-F6

GENERATOR DESCRIPTION: F-BEG-TRANSP-AIR

1. DEFINE OBJECTIVE. Define the air transportation unit objective. Set the objective (D2a) equal to the current location of the objective unit on D1.

2. EXPLICIT TRAVEL. If explicit travel, trigger the A-START-FLIGHT action for AIR-TRANSP-EX to set objective. Pass control of the transporter (D3) to the air module where routes and speed will be completed.

3. IMPLICIT TRANSPORTATION. If implicit transportation, trigger the A-START-TRAVEL action (D2b) for AIR-TRANSP-EX. Trigger the function F-AIR-IMP-TRAVEL with D4. This will compute a delay time to move the flight.

C-F7 F-GND-IMP-TRAVEL TYPE: Interactive Function

SUMMARY: This function is triggered after an explicit unit has selected implicit travel and computes a delay time corresponding to the time of a move from the current transporter unit location to an objective. An end of delay event is set.

TRIGGERED BY: F-BEG-TRANSP-GND (C-F5)

RESULTING IN: F-ATOBJ-GND (C-F10) Scheduled

SYSTEM SPECIFICATION DIAGRAM:

See figure C-21.

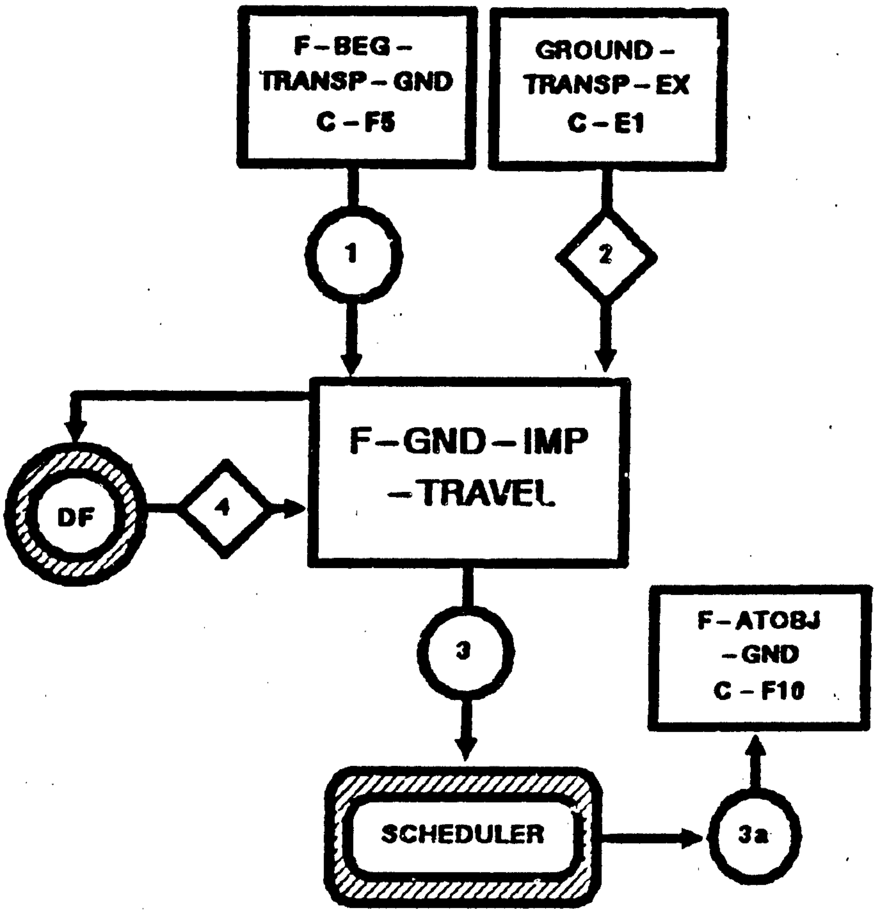

Figure C-21. F-GND-IMP-TRAVEL SSD

C-F7

DATA DEFINITION: F-GND-IMP-TRAVEL

Connection Number	Data Transferred	Comments
D1	o Ground unit ID	Triggers this function.
D2	o Ground unit objective o Ground vehicle type o Current X, Y location o Travel flag	Ground transporter. Indicates implicit or explicit travel.
D3a	o Unit ID	Schedule delay.
D3b	o Delay time	
D4a	o Movement rate	Implicit movement rates (C-DF6).
D4b	o Day/night o Dry/wet o Summer/winter	Weather data.

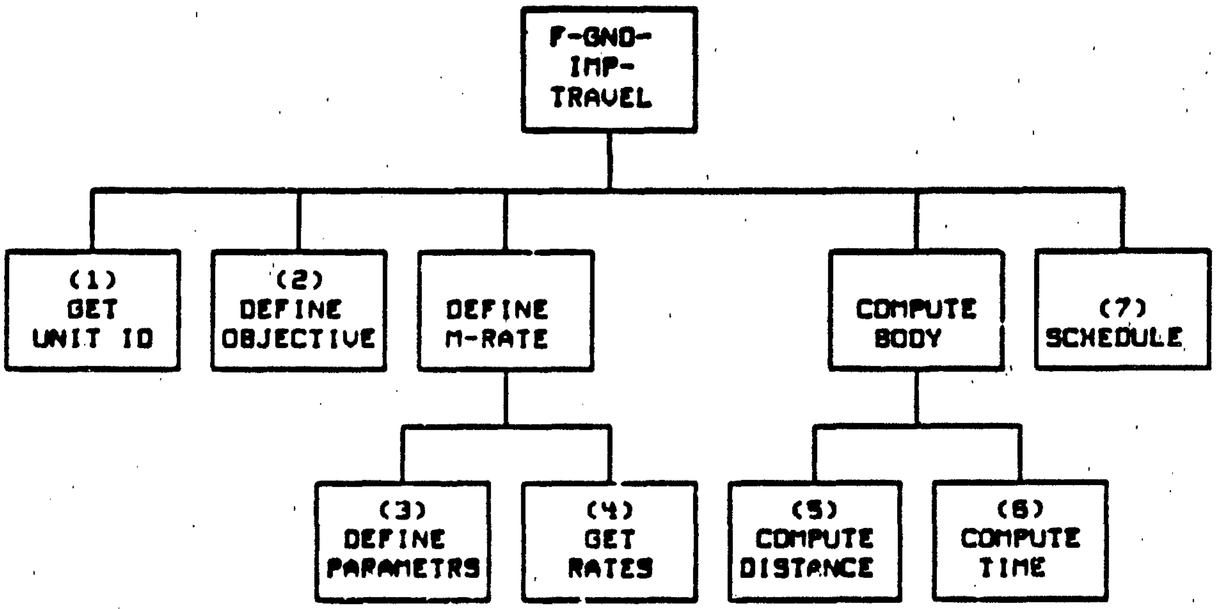

Figure C-22. F-GND-IMP-TRAVEL generator

C-F7

GENERATOR DESCRIPTION: F-GND-IMP-TRAVEL

1. GET UNIT ID. Read the unit ID from the D1 file.

2. DEFINE OBJECTIVE. Determine the X, Y objective location by checking the state vector of the transporter unit.

3. DEFINE PARAMETERS. Define the parameters necessary to determine the movement rate for this leg of the journey:

   a. Vehicle type (defined on S2)

   b. Environmental conditions (D4b):

      o Day/Night
      o Rain or Snow/Dry
      o Summer/Winter

There will be a set of these data for each theater played.

4. GET RATES. Get the movement rate from D4a using the parameters defined in step 3. The rate is an average straight line movement rate given in meters per minute.

5. COMPUTE DISTANCE. Compute the straight line distance to be moved. Both the current location and the objective location are obtained in the state vector check (S2). The distance is

$$DIST = (X_{CURRENT} - X_{NEW})^2 + (Y_{CURRENT} - Y_{NEW})^2.$$

6. COMPUTE TIME. Compute the time needed to move by multiplying the movement rate by the distance (D3b).

7. SCHEDULE. Schedule the F-ATOBJ-GND function using (D3a) and the delay time (D3b) computed in step 6.

C-F8 **F-AIR-IMP-TRAVEL** **TYPE: Interactive Function**

SUMMARY: This function is triggered after an explicit flight selects implicit travel and computes a delay time corresponding to the time to fly from the current transporter unit location to an objective. An end of delay event is set.

TRIGGERED BY: F-BEG-TRANSP-AIR (C-F6)

RESULTING IN: F-ATOBJ-AIR (C-F11) Scheduled

SYSTEM SPECIFICATION DIAGRAM:

See figure C-23.

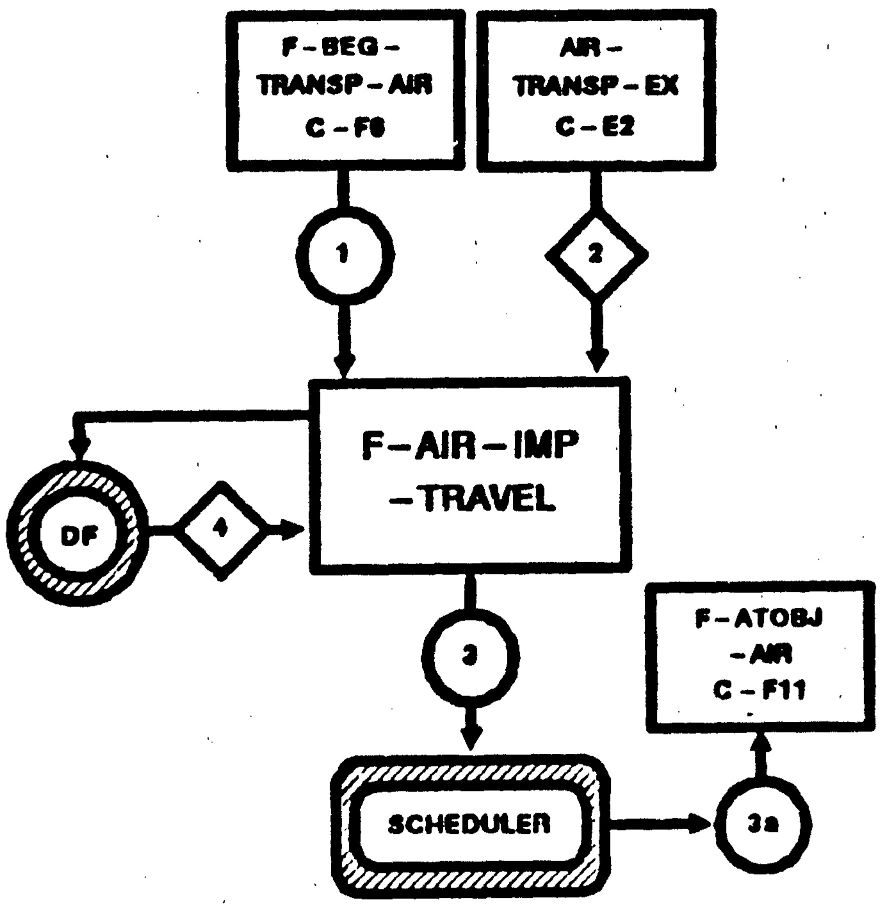

Figure C-23. F-AIR-IMP-TRAVEL SSD

C-F8

DATA DEFINITION: F-AIR-IMP-TRAVEL

Connection Number	Data Transferred	Comments
D1	o Air unit ID	Triggers this function.
S2	o Air unit objective o Aircraft type o Current X, Y location o Travel flag	Indicates implicit or explicit travel.
D3a	o Unit ID	Schedule delay.
D3b	o Delay time	
D4a	o Movement rate	Implicit movement rates (C-DF6).
D4b	o Day/night o Visibility	Weather data.

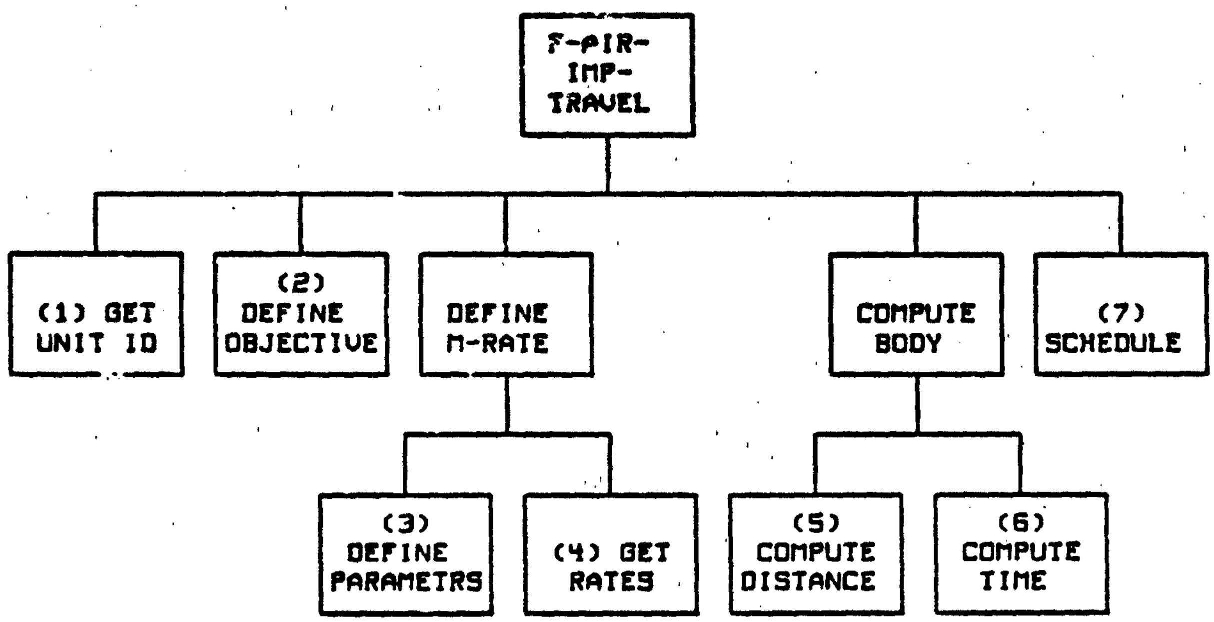

Figure C-24. F-AIR-IMP-TRAVEL generator

C-F8

GENERATOR DESCRIPTION: F-AIR-IMP-TRAVEL

1. GET UNIT ID. Read the unit ID from the D1/D2 file.

2. DEFINE OBJECTIVE. Determine the X, Y objective location by checking the state vector of the transporter unit.

3. DEFINE PARAMETERS. Define the parameters necesary to determine the flight rate for this movement leg. The parameters are as follows:

   a. Aircraft type (defined on S2)

   b. Day/night (D4b)

   c. Visibility (D4b)

There will be a set of these data for each theater played.

4. GET RATES. Get the flight rate from D4a using the parameters defined in step 3. The rate is an average straight-line flight rate given in meters per minute.

5. COMPUTE DISTANCE. Compute the straight-line distance to be moved. Both the current location and the objective location are obtained in the state vector check (S2). The distance then is:

$$DIST = (X_{CURRENT} - X_{NEW})^2 + (Y_{CURRENT} - Y_{NEW})^2$$

6. COMPUTE TIME. Compute the time to fly by multiplying the flight rate by the distance (D3b).

7. SCHEDULE. Schedule the F-ATOBJ-AIR function using D3a and the delay time computed in 6 (D3b).

C-F9 F-REDIRECT TYPE: Interactive Function

SUMMARY: This function is triggered by either the movement module or the air module to check the transport unit's current objective unit location. A transportation unit (ground or air) travels along a movement path in short segments. F-REDIRECT is triggered before each new segment. A transportation unit's current objective may be changed in two ways:

1. The objective location may be changed by the gamer by entering new objective coordinates.

2. The objective can be changed automatically if the destination is a unit and that unit moves.

TRIGGERED BY: Movement module Air module
Gamer

RESULTING IN:

GND-TRANSP-EX	(C-E1)
AIR-TRANS-EX	(C-E2)
A-REDIRECT	(C-A8)

SYSTEM SPECIFICATION DIAGRAM:

See figure C-25.

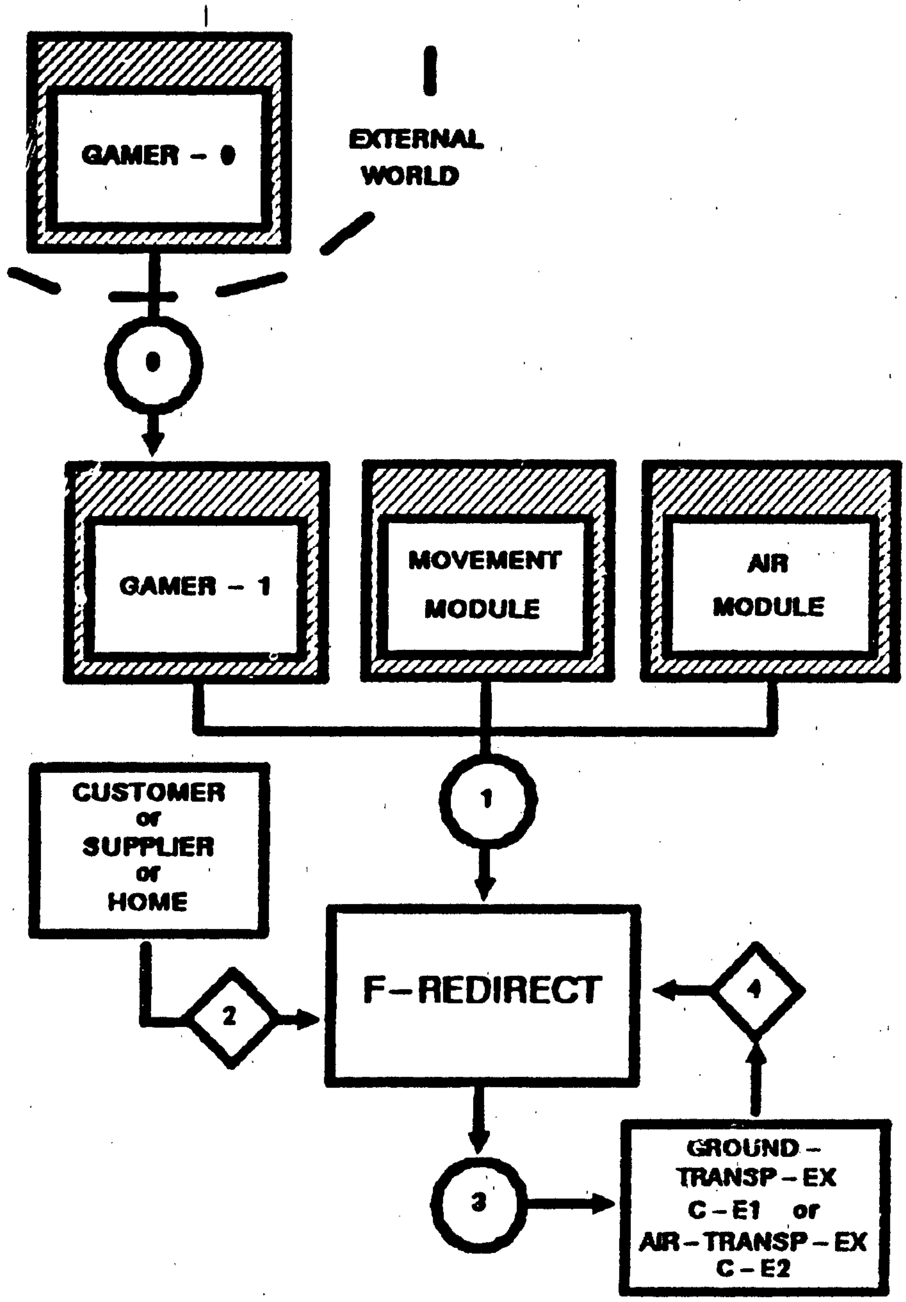

Figure C-25. F-REDIRECT SSD

C-F9

DATA DEFINITION: F-REDIRECT

Connection Number	Data Transferred	Comments
D0	o Transport unit ID o Objective unit ID o Supplier or customer ID	Unfiltered data.
D1	o Input type flag o Transport unit ID o Objective unit ID	Filtered data.
S2	o Objective unit location	Destination unit.
D3	o New transporter objective unit ID o New transporter objective location o Flag indicating gamer or model o Supplier or customer objective	Written to transporter.
S4	o Objective unit ID	

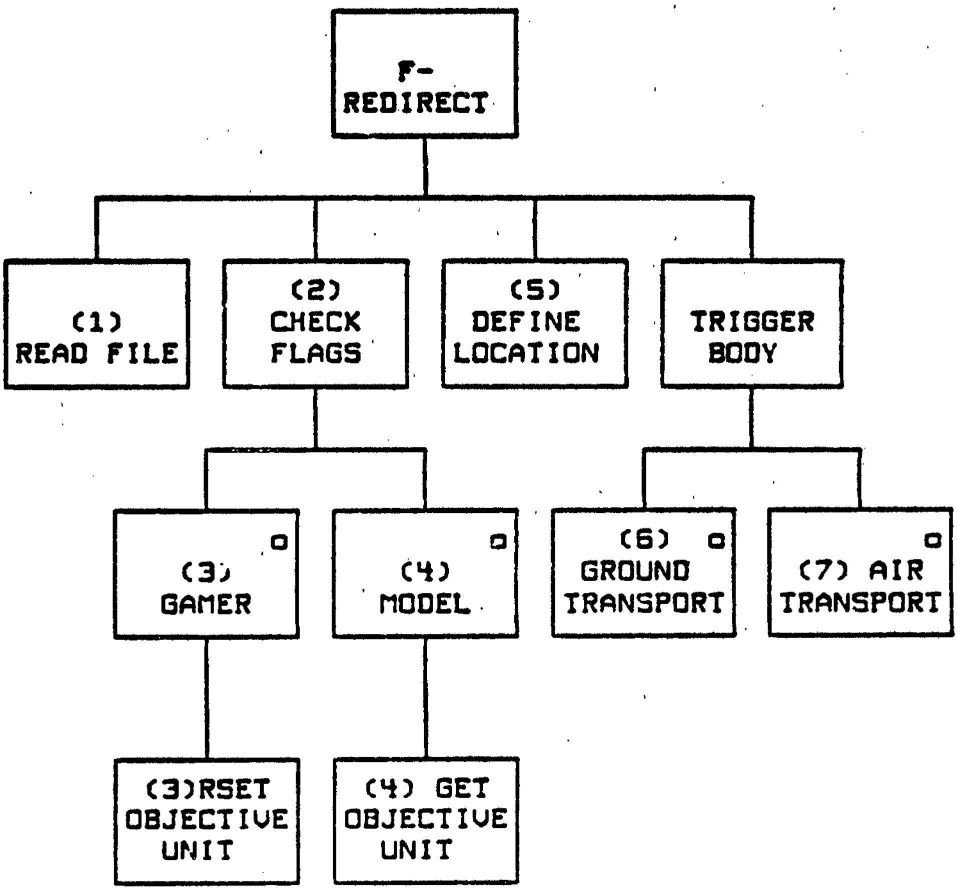

Figure C-26. F-REDIRECT generator

C-F9

GENERATOR DESCRIPTION: F-REDIRECT

1. READ FILE. Read file D1.

2. CHECK FLAG. Check the flag to determine if the activator is from the gamer or from the model. The flag values are as follows:

- o 1 = A model-generated call
- o 2 = A gamer-generated change to the objective customer ID
- o 3 = A gamer-generated change to the objective supplier ID

3. GAMER-GENERATED. If this function is initiated by a gamer, the objective unit ID is the objective unit ID read in D1.

4. MODEL-GENERATED. If this function is initiated by the model, the objective unit ID is obtained by a state vector check (S4).

5. DEFINE LOCATION. Using the objective unit ID described in either step 3 or 4, obtain the objective unit's current location (S2).

6. GROUND TRANSP. Trigger A-REDIRECT action for a GND-TRANSP-EX. Pass the parameters defined above and set a flag to indicate whether this was a gamer- or model-activated call (D3).

7. AIR TRANSP. Trigger A-REDIRECT action for an AIR-TRANSP-EX. Pass the parameters defined above and set a flag to indicate whether this was a gamer- or model-activated call (D3).

C-F10

C-F1 F-ATOBJ-GND TYPE: Interactive Function

SUMMARY: This function is triggered whenever an explicit ground transport unit reaches its objective. The movement module has an implied end-of-move action. Anytime an end-of-move is completed and the transport unit is at its objective or the implicit travel mode completes a cycle, this function is triggered through the transportation dispatcher. The unit can be traveling either in the explicit mode or the implicit mode. A check is made to ensure the transporter is either at its home, customer, or supplier. The next action in the transporter's work life is triggered.

TRIGGERED BY: Transportation dispatcher:
- o via movement module
- o following an implicit travel cycle

RESULTING IN:

F-TRANSP-PM	(C-F12)	
GND-TRANSP-EX	(C-E1)	
A-END-TRAVEL	(C-A6)	
F-ARRIVE-SUPPLIER	(D-F12)	Supply
F-ARRIVE-CUSTOMER	(D-F17)	Supply
F-DISPER	(E-F3)	Personnel
F-LOADPER	(E-F14)	Personnel

SYSTEM SPECIFICATION DIAGRAM:

See figure C-27.

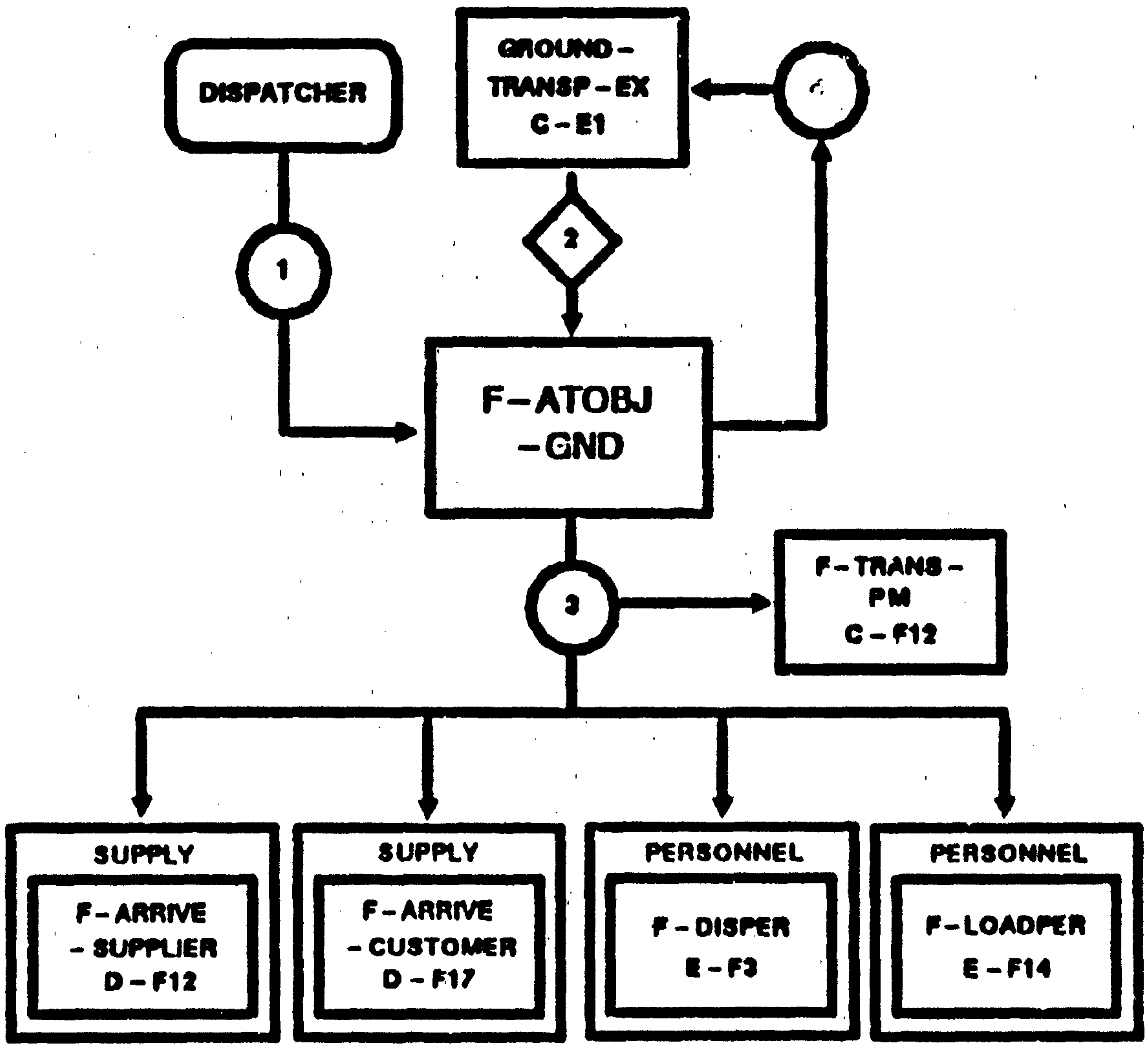

Figure C-27. F-ATOBJ-GND SSD

DATA DEFINITION: F-ATOBJ-GND

Connection Number	Data Transferred	Comments
D1	o Transport unit ID	Triggers function.
S2	o Current unit ID o Objective unit ID o Customer unit ID o Supplier unit ID o Parent unit ID o T-CON unit ID o Objective save unit ID o MOPP status	Transporter state vector.
D3	o Transport unit ID	Signals the arrival of a transporter.
D4	o Objective unit ID o MOPP status of transport	Triggers A-END-TRAVEL.

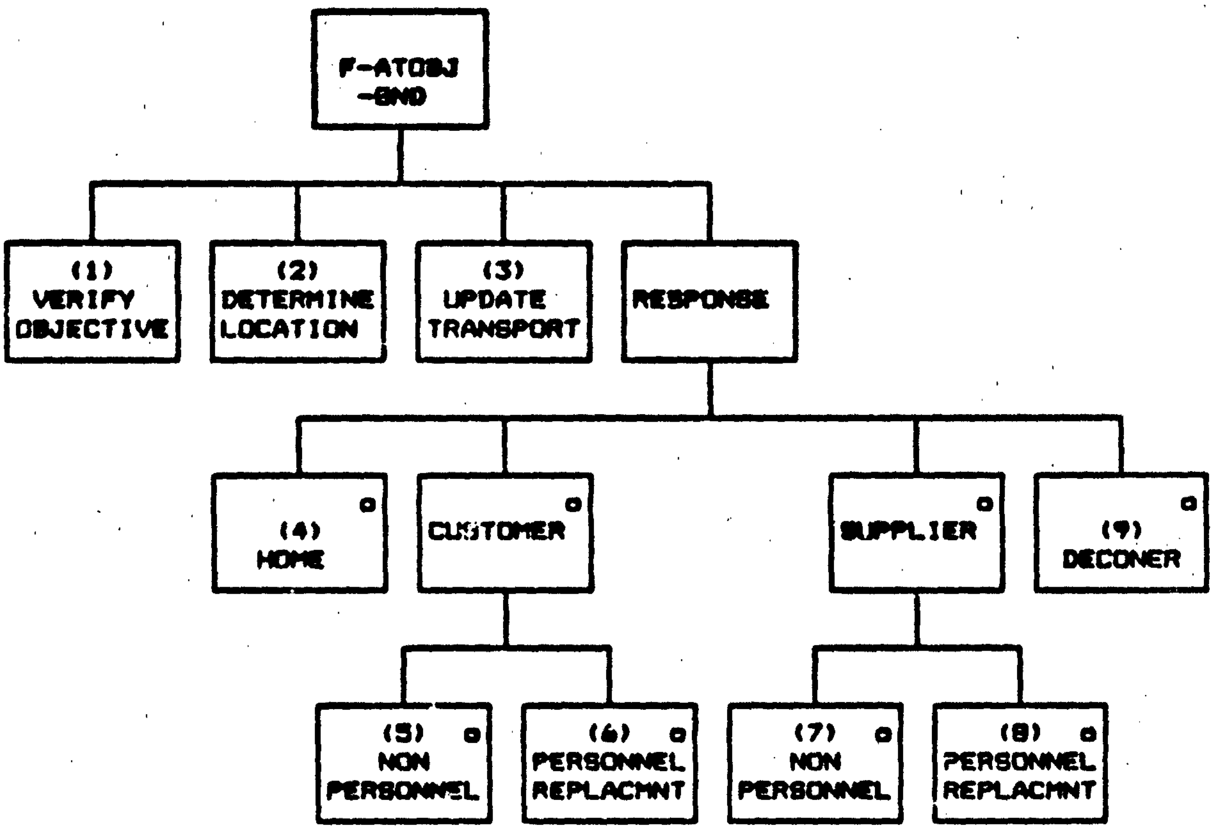

Figure C-28. F-ATOBJ-GND generator

GENERATOR DESCRIPTION: F-ATOBJ-GND

1. VERIFY OBJECTIVE. Read file D1. Perform a check to determine the identification of all friendly units within the area. (Note: This depends on the computer functions available within an area defined as 3,000 meters or less.) Using the objective unit ID obtained in S2, compare the objective unit ID to the list of friendly units in the area defined in S2 to verify that the transporter is in the correct location. If the objective unit ID is not on the list of friendly units, return to the move sequence.

2. DETERMINE LOCATION. Using data obtained in S2, determine whether the transporter has arrived at the parent unit, the customer, the supplier, or the decon unit.

3. UPDATE TRANSPORT. Trigger A-END-TRAVEL for GND-TRANSP-EX with D4 to update the transporter's location and MOPP status.

4. HOME. If the transporter is at the parent unit, trigger an F-TRANSP-PM with D3 to schedule PM.

5. NON-PERSONNEL CUSTOMER. If the transporter is at the customer unit and not carrying personnel, trigger the supply module function F-ARRIVE-CUSTOMER (D3).

6. PERSONNEL REPLACEMENT CUSTOMER. If the transporter is at the customer and is carrying personnel, trigger the personnel replacement module function F-DISPER (D3).

7. NON-PERSONNEL SUPPLIER. If the transporter is at the supplier unit and is not picking up personnel, trigger the supply module function F-ARRIVE-SUPPLIER (D3).

8. PERSONNEL REPLACEMENT SUPPLIER. If the transporter is at the supplier unit and is picking up personnel, trigger the personnel replacement module function F-LOADPER (D14).

9. DECON UNIT. If the objective save unit ID (S2) is not equal to zero, the unit has been diverted to a decon unit. Trigger the function F-DECISION (H-F1) in the decon module to determine if the transporter needs to be decontaminated. If it does, it will be added to the decon unit's customer queue.

C-F11 F-ATOBJ-AIR TYPE: Interactive Function

SUMMARY: This function is triggered anytime an explicit air transporter unit reaches its objective. The air module has an implied end-of-flight action. Anytime an end-of-flight is completed and the transporter is at its objective, or when the implicit travel mode completes a cycle, this function is triggered by the dispatcher. The unit can be traveling either in the explicit flight mode or the implicit travel mode. A check is made to ensure the transporter is either at its home, customer, or supplier. The next action in the transporter's work life is triggered.

TRIGGERED BY: Transportation dispatcher:

- o via air module
- o following an implicit travel cycle

RESULTING IN:

F-TRANSP-PM	(C-F12)	
F-ARRIVE-SUPPLIER	(D-F12)	Supply
F-ARRIVE-CUSTOMER	(D-F17)	Supply
F-DISPER	(E-F3)	Personnel
F-LOADPER	(E-F14)	Personnel
AIR-TRANSP-EX	(C-E2)	
A-END-TRAVEL	(C-A6)	
A-END-UNLOAD	(C-A12)	

SYSTEM SPECIFICATION DIAGRAM:

See figure C-29.

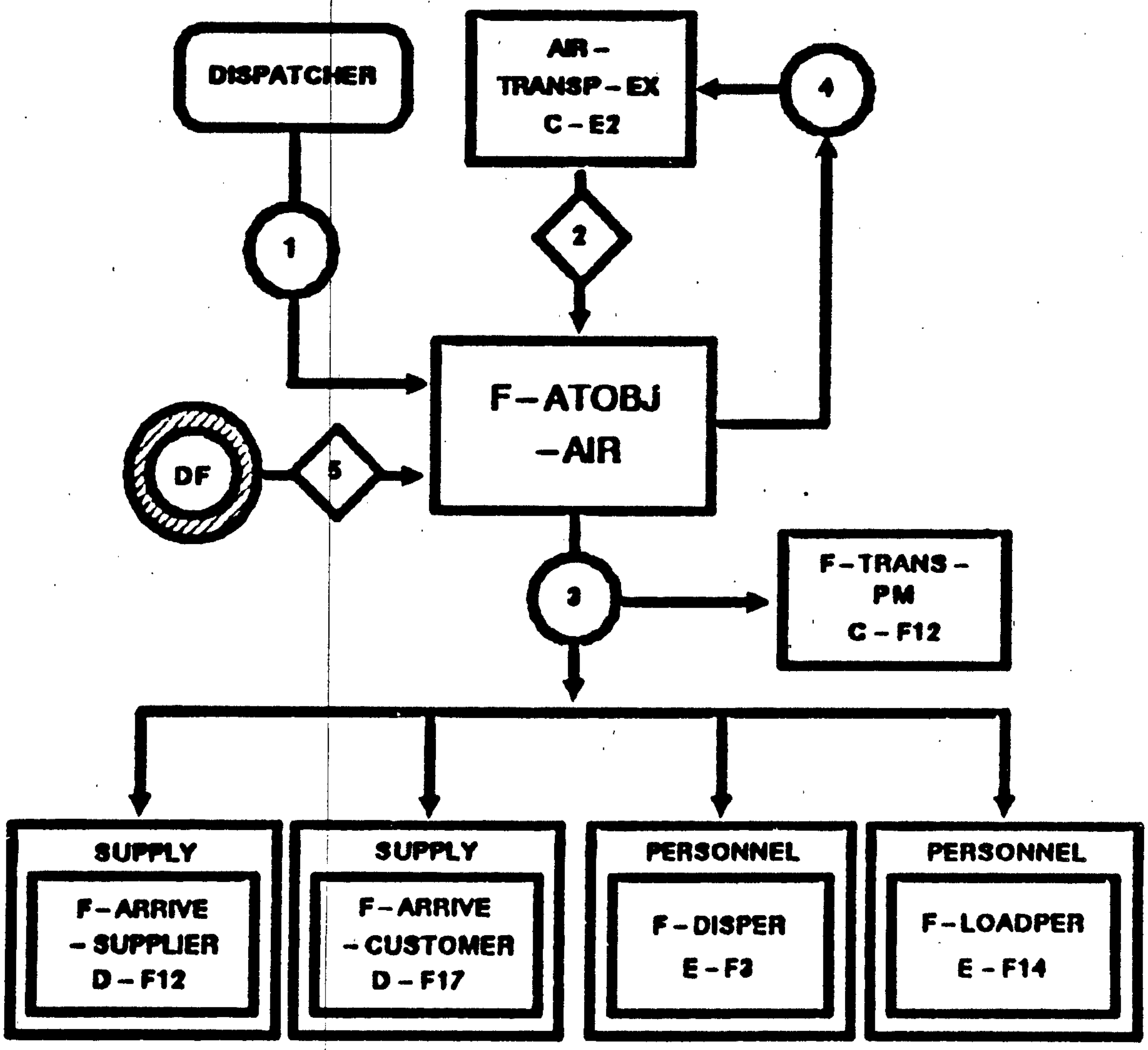

Figure C - 29. F - ATOBJ - AIR SSD

C-F11

DATA DEFINITION: F-ATOBJ-AIR

Connection Number	Data Transferred	Comments
D1	o Transportation unit ID	Triggers function.
S2	o Objective unit ID o Customer unit ID o Supplier unit ID o Parent unit ID o MOPP status	Transporter state vector.
D3	o Transport unit ID	Signals arrival of a transporter.
D4	o Objective unit ID o MOPP status of transport	Triggers A-END-TRAVEL.
D5	o Terrain data	

C-F11

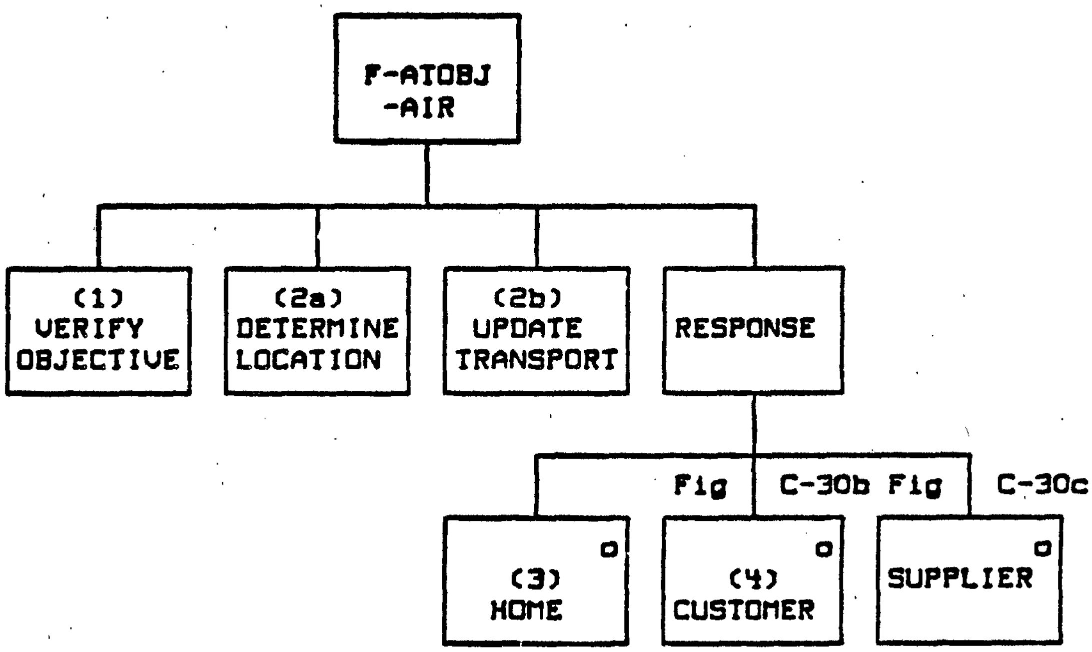

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Figure C-30a. F-ATOBJ-AIR generator

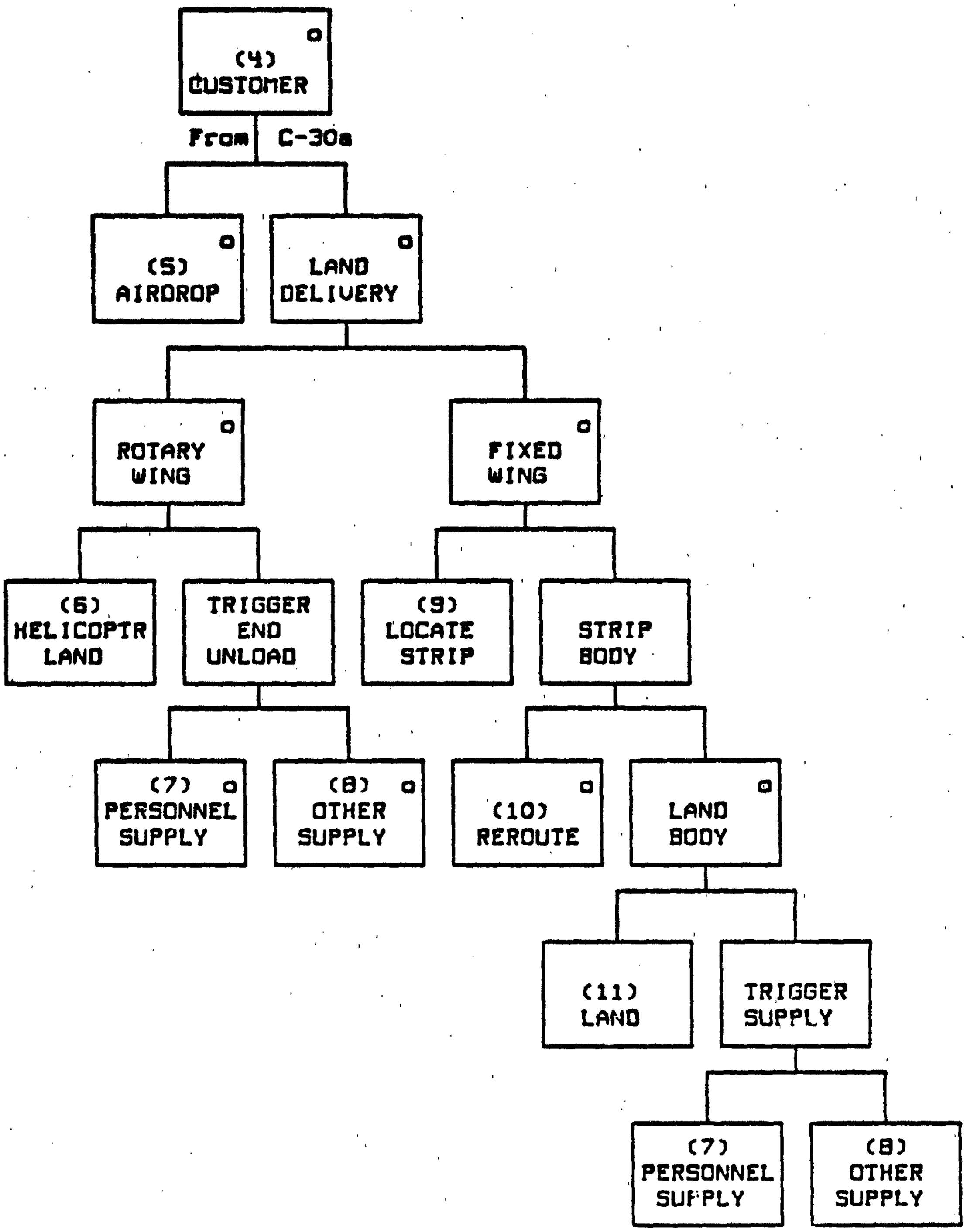

Figure C-30b. F-ATOBJ-AIR generator (continued)

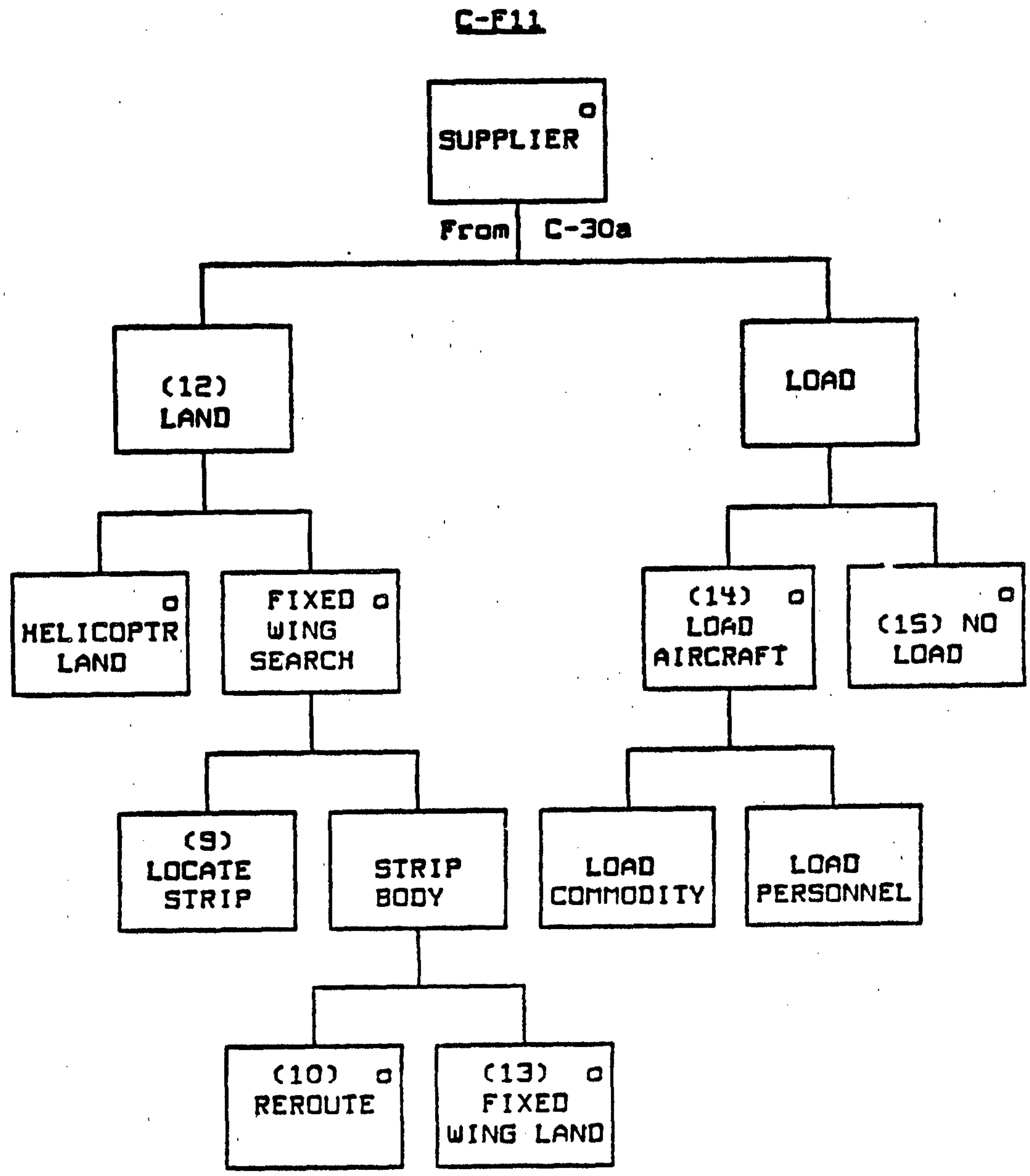

Figure C-30c. F-ATOBJ-AIR generator (continued)

C-F11

GENERATOR DESCRIPTION: F-ATOBJ-AIR

1. VERIFY OBJECTIVE: Read file D1. Perform a check to determine the identification of all friendly units within the area. (Note: This depends on the computer functions available within an area defined as 3,000 meters or less.) Compare the objective unit ID obtained in S2 with entries on the list of friendly units in the area defined in S2 to verify the transporter is in the correct location. If the objective unit ID is not on the list of friendly units, return to the fly sequence (air module).

2a. DETERMINE LOCATION. Using data obtained in S2, determine whether the transporter has arrived at the parent unit, the customer, or the supplier.

2b. UPDATE TRANSPORT. Trigger A-END-TRAVEL for GND-TRANSP-EX with D4 to update the transporter's location. If the unit is to land, update the MOPP status. The MOPP of the transporter is compared with the MOPP of the objective unit and is set to the higher level.

3. HOME. If the transporter is at the parent unit, trigger F-TRANSP-PM with D3 to schedule PM. Go to the end of this function.

4. CUSTOMER. If the transporter is at a customer unit, continue with steps 5 through 11. If it is at a supplier, go to the supplier process (step 12).

5. AIRDROP. If the customer is to receive the commodity by airdrop, trigger the A-END-UNLOAD action using (D3). The commodity could be any supply class or personnel. No time delay will be added to unload the commodity.

6. HELICOPTER LAND. If the customer is to receive the commodity by having a helicopter land at the customer location, set the speed and altitude to zero. Add the flight "unit" to the unit occupancy list of the grid/hex involved. Assume a helicopter can always find a place to land inside the grid size played in a corps model.

7. PERSONNEL SUPPLY. If the transport aircraft has landed and is carrying personnel, trigger the personnel replacement module function F-DISPER (D3). Go to the end of this function.

8. OTHER SUPPLY. If the transport aircraft has landed and is carrying any commodity other than personnel, trigger the supply module function F-ARRIVE-SUPPLIER (D3).

F-ATOBJ-AIR (cont.)

9. LOCATE STRIP. Determine if the aircraft can land in the specified area. A simple approach should be taken. There will be very few landing strips available in a corps area. Check a list of these airstrips to see if the aircraft is in a grid that is defined as flat and unforested (D5); if so, allow the aircraft to land.

10. REROUTE. If no landing area is available, reroute the aircraft. (This situation should not happen unless the airstrip has been destroyed because the aircraft wouuld have checked for a landing area before taking off.) Redefine the aircraft objective as its home airfield and trigger the air module.

11. FIXED WING LANDING (CUSTOMER). If the customer is receiving the commodity by having an FW aircraft land at the customer location, set the speed and altitude to zero. Add the flight "unit" to the unit occupancy list of the grid/hex involved and repeat steps 7 and 8..

12. HELICOPTER LANDING (SUPPLIER). Set the helicopter's speed and altitude to zero. Add the flight "unit" to the unit occupancy list of the grid/hex involved and proceed to step 14.

13. FIXED WING LANDING (SUPPLIER). Set the speed and altitude to zero. Add the flight "unit" to the unit occupancy list of the grid/hex involved. Repeat steps 9 and 10 and continue.

14. LOAD AIRCRAFT. If the transport aircraft is at the supplier and picking up personnel, trigger the personnel replacement module function F-LOADPER (D14). If the transport aircraft is at the supplier and picking up a commodity other than personnel, trigger the supply module function F-ARRIVE-SUPPLIER (D3).

15. NO LOAD. If the aircraft is rerouted, do not perform a load action.

C-F12 F-TRANSP-PM TYPE: Interactive Function

SUMMARY: This function is called when a transportation mission ends. A delay is calculated to represent the total time between the vehicle/aircraft's arrival at home and the time it would be available for another mission. The delay time includes time to perform preventive maintenance plus any other pertinent time.

TRIGGERED BY:	F-ATOBJ-GND	(C-F10)	
	F-ATOBJ-AIR	(C-F11)	
RESULTING IN:	GND-TRANSP-EX	(C-E1)	
	AIR-TRANSP-EX	(C-E2)	
	A-BEGIN-PM	(C-A9)	
	F-TRANSP-RETURN	(C-F17)	Scheduled

SYSTEM SPECIFICATION DIAGRAM:

See figure C-31.

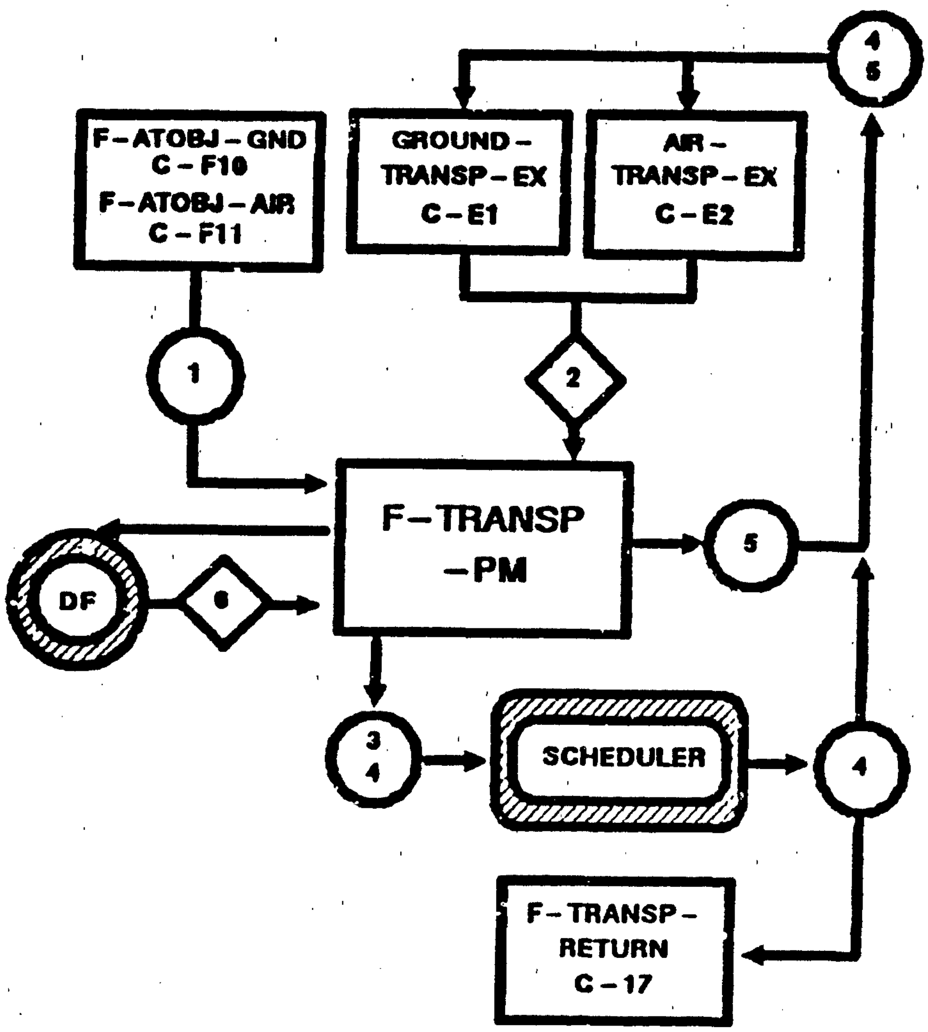

Figure C-31. F-TRANSP-PM SSD

C-F12

DATA DEFINITION: ATOBJ-AIR

Connection Number	Data Transferred	Comments
D1	o Transport unit ID	Triggers function.
S2	o Vehicle types	
D3	o Delay time	Sent to scheduler.
D4	o Transport unit ID o Transport supplier ID (Transporter parent unit ID)	Required by transporter, parent and scheduler.
D5	o Transport unit ID o Flag indicating action	Triggers A-BEGIN-PM.
D6	o Delay time for each vehicle/aircraft type	PM data file.

C-F12

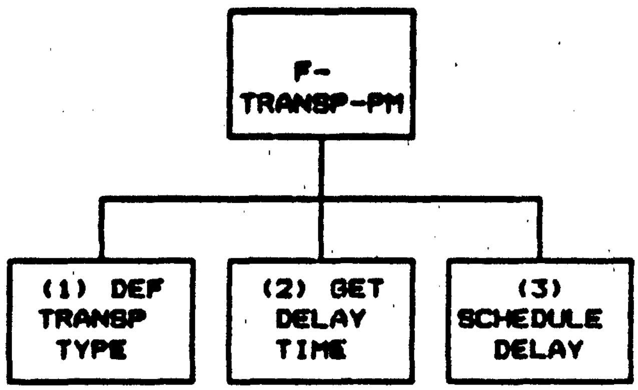

Figure C-32. F-TRANSP-PM generator

C-F12

GENERATOR DESCRIPITON: F-TRANSP-PM

1. DEFINE TRANSPORT TYPE. Determine the types of vehicles (S2) in the transport unit. A convoy or flight can contain several types of trucks or aircraft.

2. GET DELAY TIME. Get the delay time (D6) for each vehicle found in step 1. The delay time on file will be a function of vehicle type only. The delay time that is the greatest for any of the vehicle types (S2) will be used (D3).

3. SCHEDULE DELAY. Set an event using the delay time (D3) defined in step 2. Trigger A-BEGIN-PM with D5 for either GND-TRANSP-EX or AIR-TRANSP-EX. After the delay has elasped, D4 will trigger the action to rejoin the transporter unit and the parent.

C-F13 F-SPLIT-CK TYPE: Interactive Function

SUMMARY: This function determines whether a ground transport unit should split at a supply point or remain as one unit. The supply module passes the amount of supplies that cannot be loaded. This function decides whether the convoy should split to go to the next supply point or home. If so, a new convoy is created using assets from the original transporter.

TRIGGERED BY:	F-TU-DECISION	(D-F15)	Supply
RESULTING IN:	F-BEG-TRANSP-GND	(C-F5)	
	GND-TRANSP-EX	(C-E1)	
	A-SPLIT	(C-A17)	
	A-DISPATCH-VEHICLE	(C-A1)	
	Set supply action flag		

SYSTEM SPECIFICATION DIAGRAM:

See figure C-33.

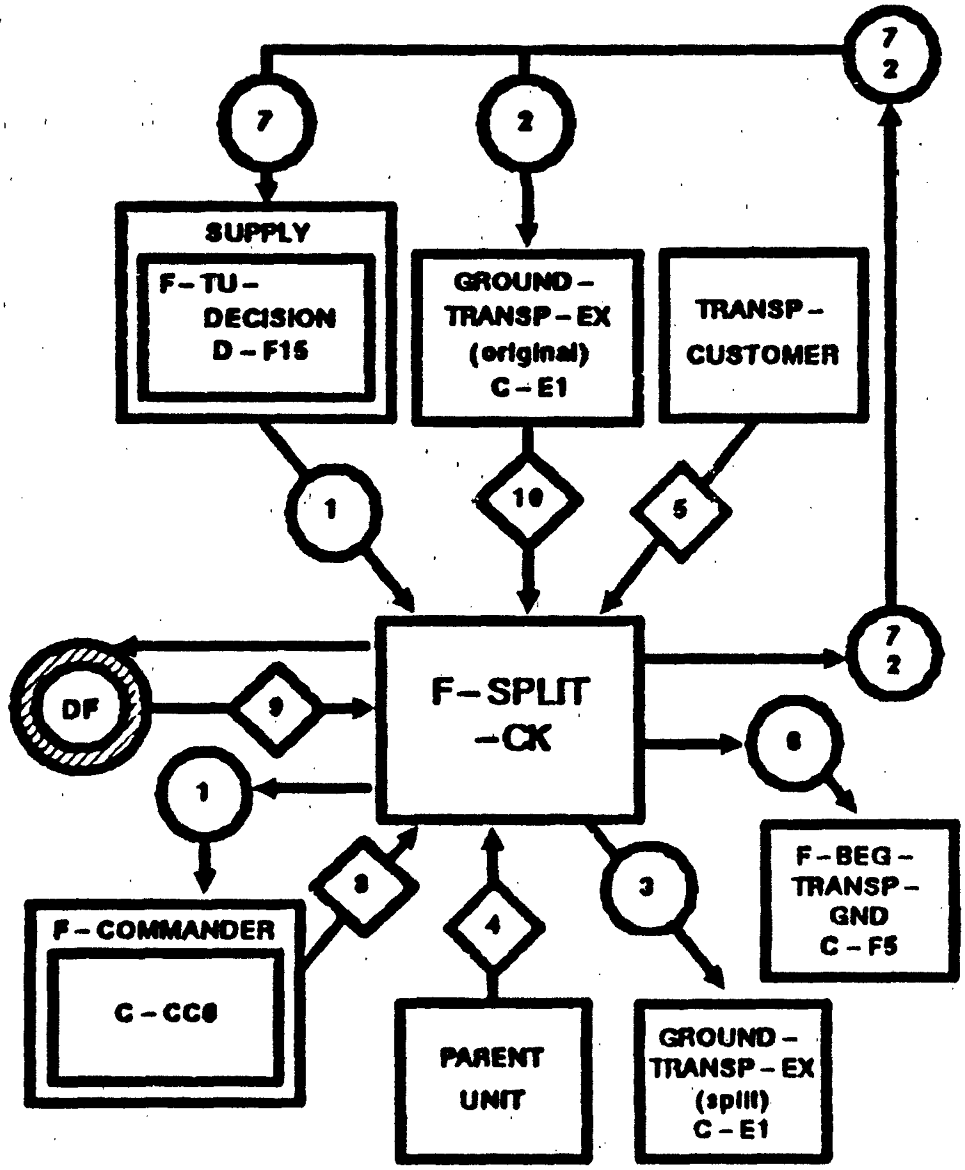

Figure C-33. F-SPLIT-CK SSD

DATA DEFINITION: F-SPLIT-CK

Connection Number	Data Transferred	Comments
D1a	o Transporter ID o Amount and type that cannot be loaded on vehicle o 0 or next supply point	Received from supply.
D1b	o Volume to be hauled o Hauling capacity	Calculated using D1a in step 1.
D2	o Transporter ID o New transporter ID o Flag indicating action	Original transporter.
D3	o Transporter ID o Parent ID o Transport supplier ID	New transporter.
D4	o X,Y coordinates	Current parent location.
D5	o X,Y coordinates	Customer location.
D6	o Unit ID o Objective unit ID o Type of move	Triggers F-BEG-TRANSP-GND. explict or implicit.
D7	o Transporter ID o Supply action flag: 1 = Load available - Drop "can't fill" 2 = Load available - Put "can't fill" in queue 3 = No load	Passed back to supply.
D8	o Action to be taken by transporter	Split decision table (C-CC6).
D9a	o Minimum convoy	Minimum transport size (C-DF8).
D9b	o Hauling capacity	Hauling capacity (C-DF3).
D9c	o Commodity Capacity	Commodity measure (C-DF4).
S10	o Convoy vehicle type o Quantity requested	Transporter.

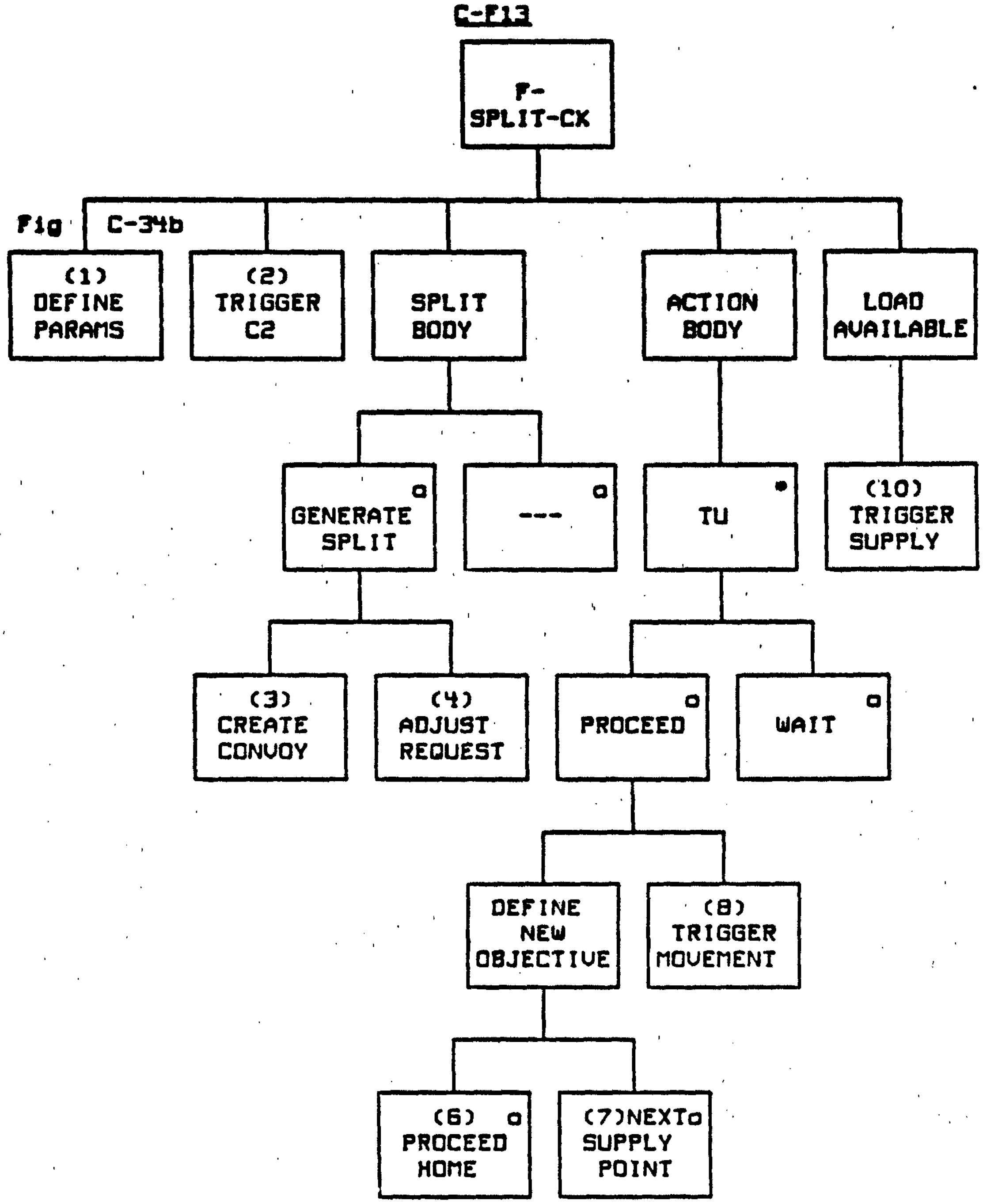

Figure C-34a. F-SPLIT-CK generator

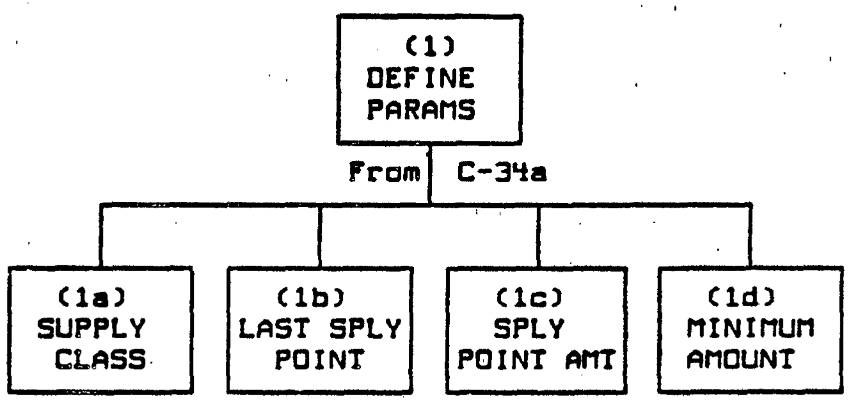

Figure C-34b. F-SPLIT-CK generator (continued)

C-F13

GENERATOR DESCRIPTION: F-SPLIT-CK

1. DEFINE PARAMETERS. Receive the prompt D1 from the transportation dispatcher. Obtain the parameters necessary to determine the action a ground transporter should take after arriving at the supplier (D8). The parameters are used to answer the following questions:

   a. What is the supply class (D1a)

   b. Last supply point flag (D1a)

   c. Does the supplier have all the commodity needed, part of the commodity needed, none of the commodity needed? (D1a)

   d. If the supplier does not have all of the commodity, is the amount remaining greater that the minimum amount for a convoy?

Compute the minimum that can be transported by multiplying minimum convoy size (9a) by hauling capacity (9b) to obtain the hauling capacity of the convoy.

Calculate the volume of the amount available at the supply point by subtracting the amount not available (D1) from the amount requested (S10) and multiplying the result by the commodity volume (D9c). Compare this minimum with the hauling capacity computed above.

2. TRIGGER C2. Trigger a call to F-COMMANDER using the parameters defined in step 1. The resulting response is returned in D8.

3. CREATE CONVOY. Call the routine that creates a temporary unit. Create a new temporary ground transport. If the unit is a ground unit, trigger the A-DISPATCH-VEHICLE action for the GND-TRANSP-EX to create a new transporter (D3). For this call, the original arriving transporter becomes the transportation supplier. Therefore, assets are subtracted from this transporter and added to the newly created transporter. This is accomplished by triggering the A-SPLIT action for the original GND-TRANSP-EX using D2.

4. ADJUST REQUEST. Trigger the A-SPLIT action (D3) for entity GND-TRANSP-EX. This will adjust the supplies to be hauled by each transporter.

5. GENERATE ACTION. Loop for each transport unit. If the unit has not been split, loop only once. If it has been split, loop for the original unit and for the newly created transporter.

F-SPLIT-CK (cont.)

6. PROCEED HOME. If either the original transport unit or the newly created unit is to proceed home, get the current location of the parent unit (D4).

7. NEXT SUPPLY POINT. If either the original transport unit or the newly created unit is to proceed to the next supply point, get the current location of the next supply point (D5). The supply point was passed from supply (D1).

8. TRIGGER MOVEMENT. Trigger function F-BEG-TRANSP-GND to initiate a move for the transporter (D6).

9. WAIT. A convoy can be told to wait. The wait can occur while supplies are being loaded or because supplies are not available.

10. TRIGGER SUPPLY. Set the flag to be returned to supply. The possible settings are:

a. Load available, drop "can't fill."

b. Load available, put "can't fill" in queue.

c. No load.

C-F14 F-SCHED-IMP-TRANSP TYPE: Interactive Function

SUMMARY: This function schedules implicit transportation. It is triggered when a mission is assigned and implicit tranportation is selected. The transporter will always be scheduled to move from parent to supplier to customer to parent. The stationery (e.g., loading time, unloading time) and movement times for the journey are determined and a delay period for each leg is calculated. The function will reschedule itself after the initial task assignment and will continue to do so until the transporter returns to the parent.

TRIGGERED BY: Transportation dispatcher

RESULTING IN:

IMPLICIT TRANSP	(C-E3)	
A-START-TRANSIT	(C-A18)	
A-END-IMP-UNIT	(C-A28)	Scheduled
A-IMP-LV-SPLR	(C-A19)	Scheduled
A-IMP-LV-CUSTOMER	(C-A15)	Scheduled

SYSTEM SPECIFICATION DIAGRAM:

See figure C-35.

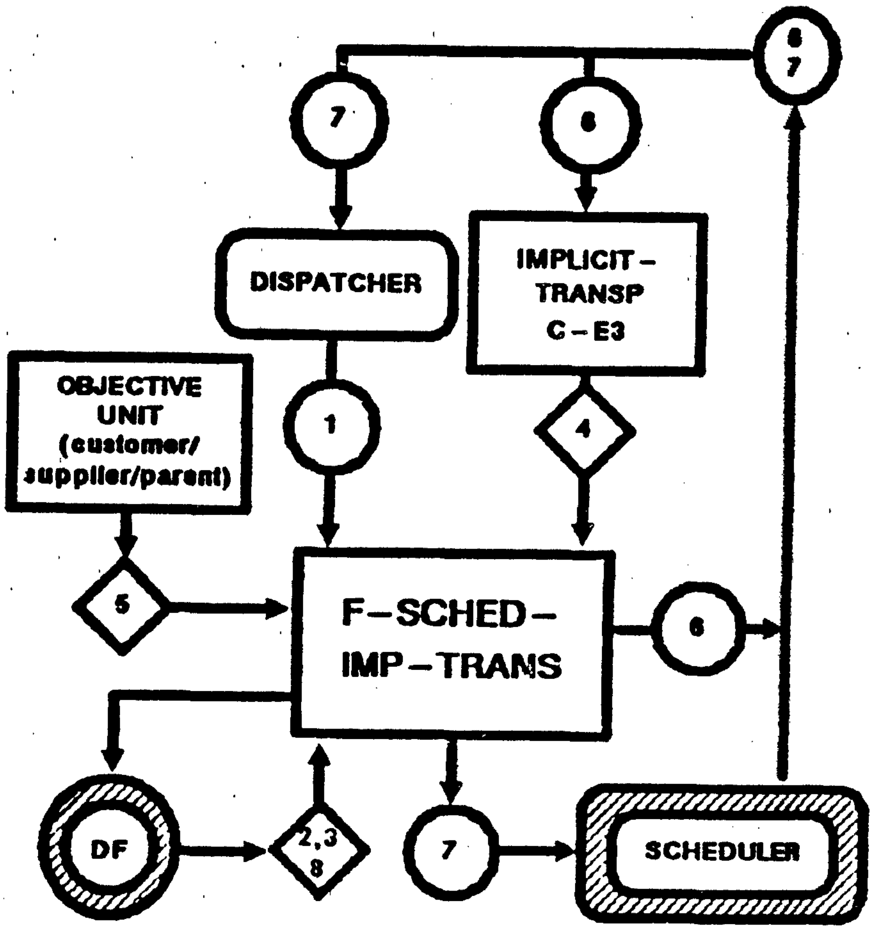

Figure C-35. F-SCHED-IMP-TRANSP SSD

C-F14

DATA DEFINITION: F-SCHED-IMP-TRANSP

Connection Number	Data Transferred	Comments
D1	o Unit record ID	
D2	o Implicit unit record	Implicit unit (C-DF9).
D3	o Delay time	Stationary delay (C-DF10).
S4	o Unit status flag	Implicit transporter.
S5	o Objective location	Parent/customer/supplier
D6	o Unit ID o Unit objective	Trigger START-TRANSIT.
D7	o Unit ID o Delay time	Scheduler.
D8	o Movement rate	Implicit move (C-DF6).

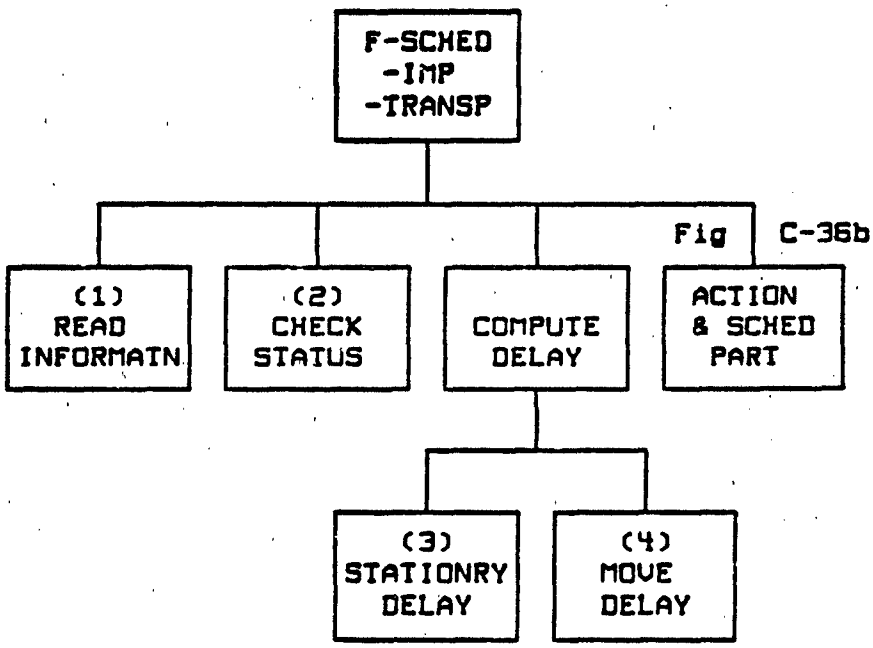

Figure C-36a. F-SCHED-IMP-TRANSP generator

C-F14

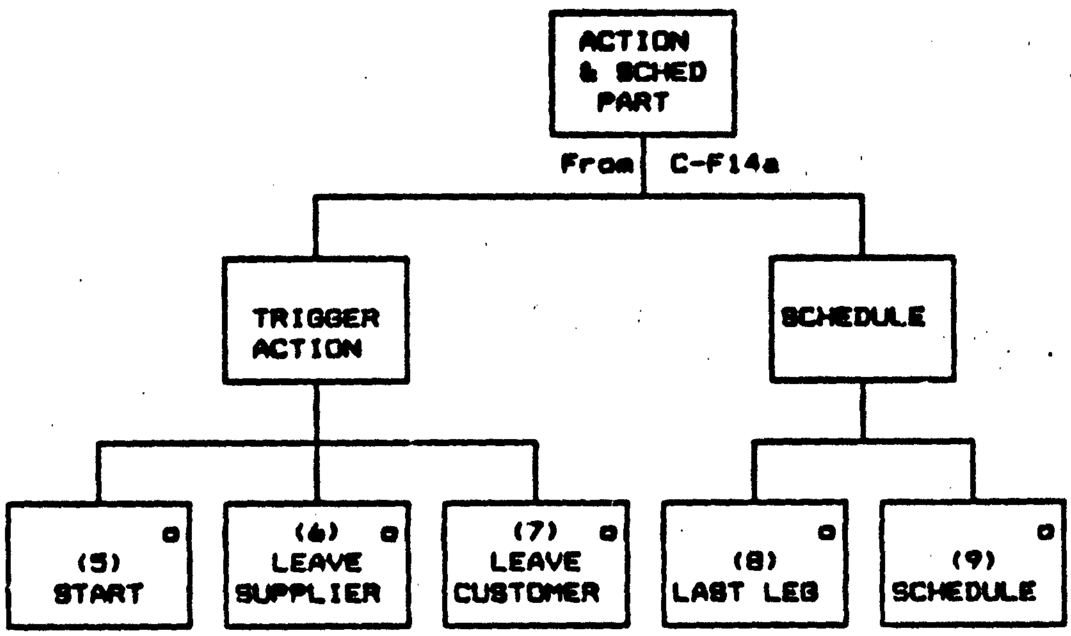

Figure C-36b. F-SCHED-IMP-TRANSP generator (continued)

GENERATOR DESCRIPTION: F-SCHED-IMP-TRANSP

1. READ. Read D1. This triggers the function. Read D2. This data file contains the record describing the implicit unit of interest.

2. CHECK STATUS. Check the current status of the transporter (S4). The unit status can be:

- o 0 = at parent ready for mission
- o 1 = at supplier
- o 2 = at customer
- o 3 = at parent with mission complete

3. STATIONARY DELAY. Get the stationary delay time from D3.

4. MOVE DELAY. Determine the next objective. The current location of the unit is determined by step 5. The unit will go from parent to supplier to customer to parent in turn. Get the objective unit location from S5. Compute the distance from the tranporter's current location (S4) to the objective location. Determine the vehicle type in the unit (S4). Get the implicit movement rate for the vehicle type (D8). Use this movement rate and the distance computed above to compute a movement time.

5. START. When the transporter is at the parent and ready for a mission, trigger the A-START-TRANSIT action for IMPLICIT-TRANSP (C-E3) using D6 to move the unit to the supplier.

6. LEAVE SUPPLIER. When the transporter is at the supplier, trigger the A-IMP-LV-SPLR action for IMPLICIT-TRANSP (C-E3) using D6. This will end an implicit travel leg, load the commodity, and start the move.

7. LEAVE CUSTOMER. When the transporter is at the customer, trigger the A-IMP-LV-CUSTOMER action for IMPLICIT-TRANSP (C-E3) using D6. This will unload the commodity and begin the move back to the parent unit.

8. LAST LEG. If the last move was to the parent, trigger the A-END-IMP-UNIT (C-A28) action for IMPLICT-TRANSP to delete the temporary unit.

9. SCHEDULE. Add the stationary delay and the movement delay to determine total implicit delay time. Schedule the next implicit leg (D7). Trigger the next A-START-TRANSIT action for IMPLICIT-TRANSP (C-E3) using D6.

C-F15 F-TRANSP-DECIDE TYPE: Interactive Function

SUMMARY: This function is triggered when a transporter has reached a key point in the mission and needs to make a decision about what to do next. A rolling stock mission will end at the customer.

TRIGGERED BY: Transportation dispatcher from:

F-ARRIVE-SUPPLIER	(D-F12)	Supply
F-ARRIVE-CUSTOMER	(D-F17)	Supply
F-DISPER	(E-F3)	Personnel
F-LOADPER	(E-F14)	Personnel

RESULTING IN:

GND-TRANSP-EX	(C-E1)	
A-RECEIVE-VEHICLE	(C-A2)	
AIR-TRANSP-EX	(C-E2)	
A-RECEIVE-AIRCRAFT	(C-A3)	
F-BEG-TRANSP-GND	(C-F5)	Scheduled
F-BEG-TRANSP-AIR	(C-F6)	Scheduled

SYSTEM SPECIFICATION DIAGRAM:

See figure C-37.

C-F15

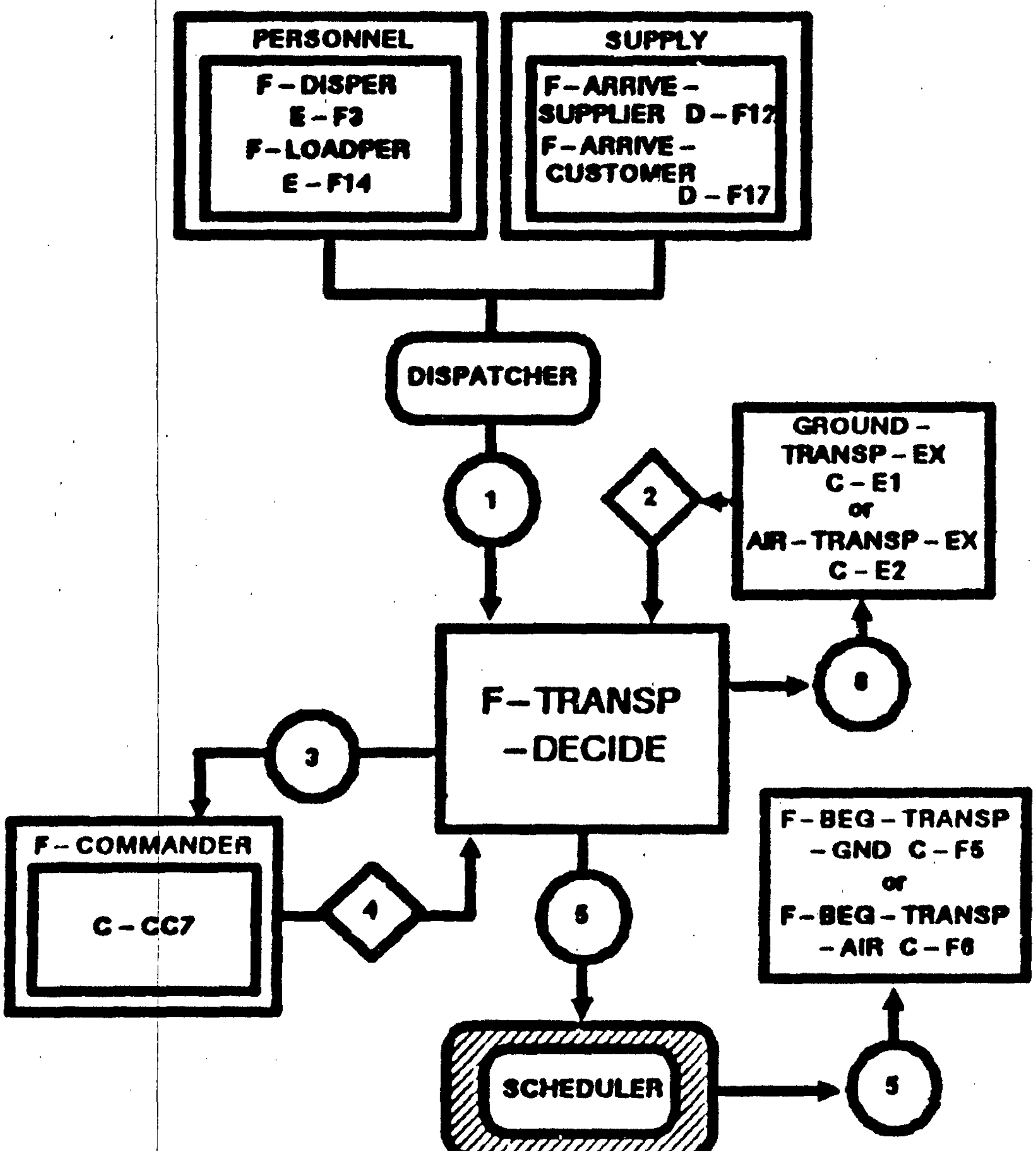

Figure C-37. F-TRANSP-DECIDE SSD

DATA DEFINITION: F-TRANSP-DECIDE

Connection Number	Data Transferred	Comments
D1	o Transporter ID	Triggers function.
S2	o Current unit ID o Customer unit ID o Supplier unit ID o Parent unit ID o Current unit location o Movement type	Transporter state vector.
D3	o Transport type o Current location (supplier or customer) o Current location echelon o Parent echelon	Triggers F-COMMANDER.
D4	o Next move response	Go home/go to customer/ check back/haul (C-CC7).
D5	o Unit ID o Objective unit ID o Type of move	Sent to scheduler. Implicit or explicit.
D6	o Transporter ID o Action	Trigger A-RECEIVE-VEHICLE or A-RECEIVE-AIRCRAFT.

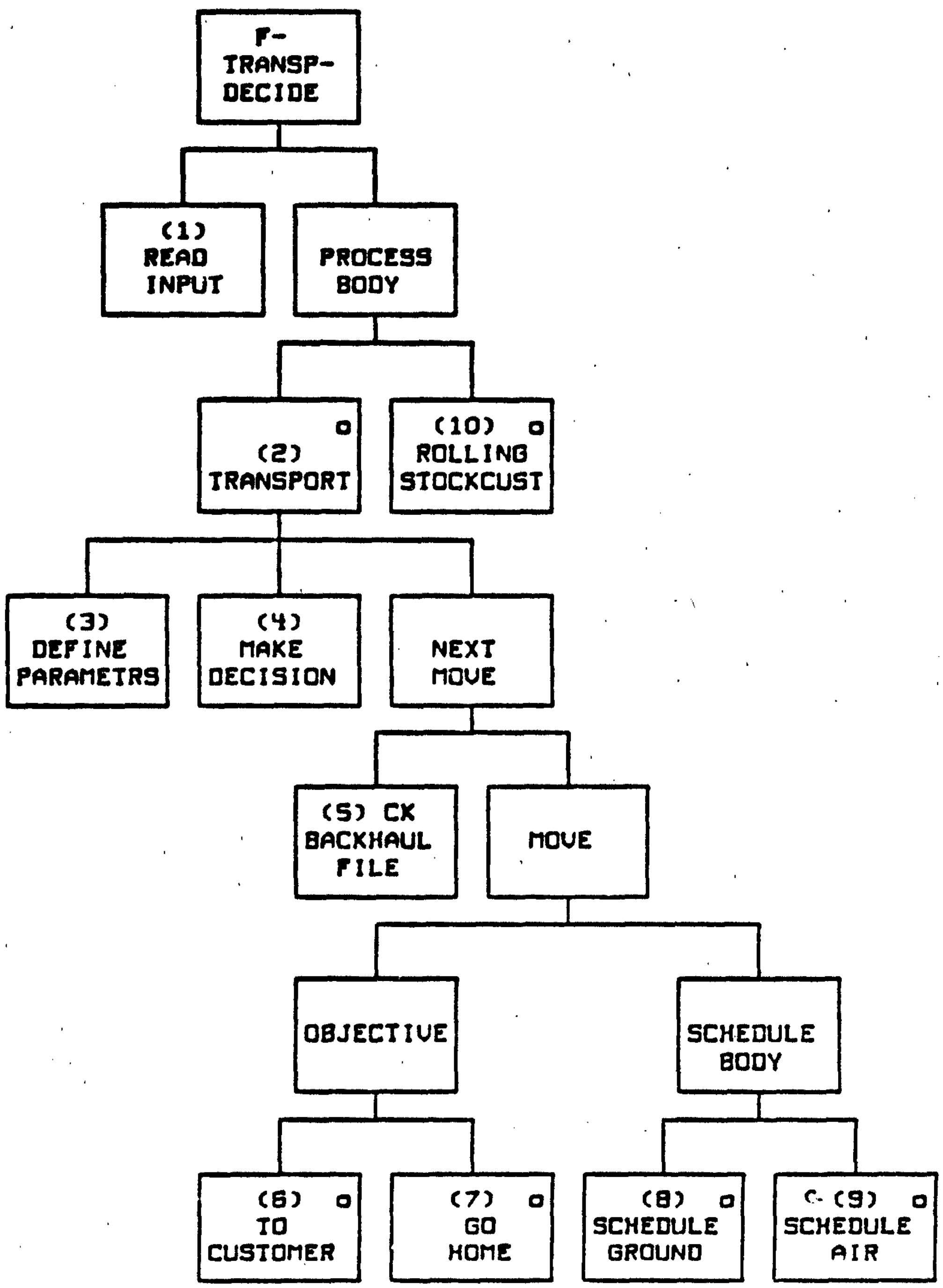

Figure C-38. F-TRANSP-DECIDE generator

C-F15

GENERATOR DESCRIPTION: F-TRANSP-DECIDE

1. READ INPUT. Read the transporter ID to be processed from D1.

2. TRANSPORT. If the transporter is not rolling stock, or if it is rolling stock not yet at the customer unit, continue processing.

3. DEFINE PARAMETERS. Define the parameters necessary to determine the next move.

4. MAKE DECISION. Using the parameters defined in step 3, access TRANSP-NEXT-MOVE (C-CC7). The response is returned in D4.

5. CHECK BACK HAUL FILE. If the vehicle is a type that can haul both ways, the back haul file is checked. This allows for missions such as HETs hauling tanks needing repair back to a repair site.

6. GO TO CUSTOMER. If the response is for the transporter to move to the customer, set the objective unit ID (D5) to the customer unit ID (D2). Set the type of move (D5) to the movement type (D2).

7. GO HOME. If the response is for the transporter to return to the parent unit, set the objective unit ID (D5) to the parent unit ID (D2). Set the type of move (D5) to the movement type (D2).

8. SCHEDULE GROUND. Schedule an event using D5 to trigger function F-BEG-TRANSP-GND. This will initiate the move for the ground convoy. No delay time is needed.

9. SCHEDULE AIR. Schedule an event using D5 to trigger function F-BEG-TRANSP-AIR. This will initiate the move for the flight or aircraft. No delay is needed.

10. ROLLING STOCK CUSTOMER. If a rolling stock transporter is at the customer unit, the mission is over. When this call is made, the stock has been subtracted out of the transporter. Trigger the A-RECEIVE-VEHICLE action for GND-TRANSP-EX (C-E1) or the A-RECEIVE-AIRCRAFT action for AIR-TRANSP-EX (C-E2) using D5. This will end the transport.

C-F16 F-TRANSP-DECON **TYPE: Interactive Function**

SUMMARY: This function is triggered by either F-TSUPPLIER, when it is setting up a ground convoy, or F-DONE-DECON, to determine whether a ground transporter needs to go thrugh decontamination while delivering commodities.

TRIGGERED BY: F-TSUPPLIER	(C-F4)	
F-DONE-DECON	(G-F6)	Decon

RESULTING IN: Definition of the objective unit and any intermediate decon objective (if necessary).

SYSTEM SPECIFICATION DIAGRAM:

See figure C-39.

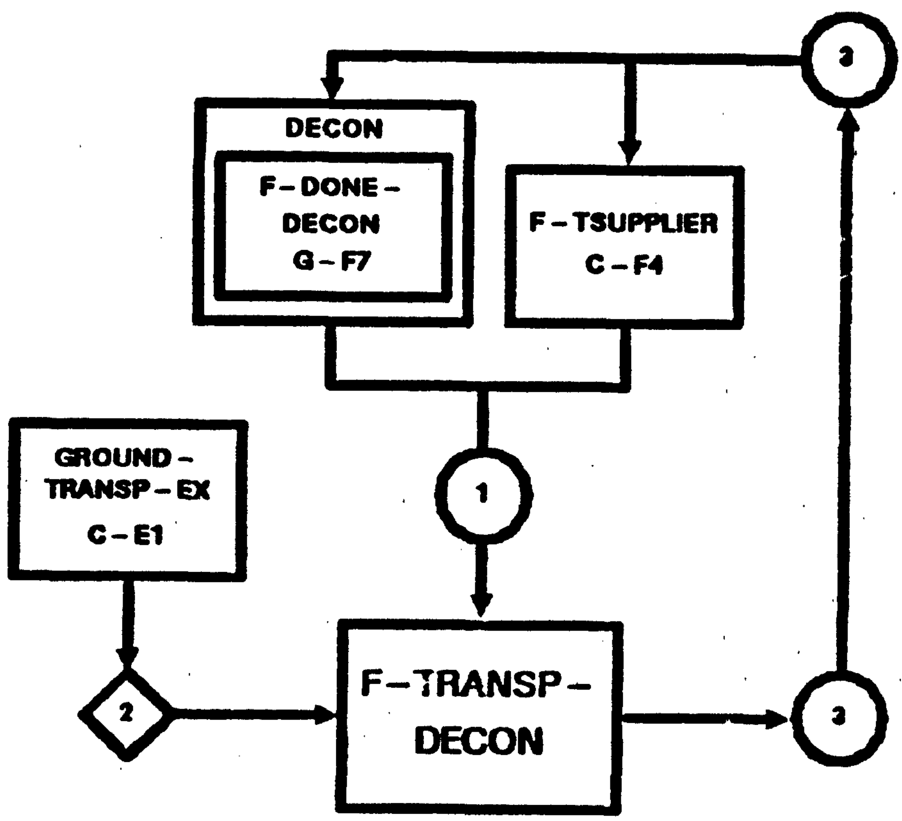

Figure C-39. F-TRANSP-DECON SSD

C-F16

DATA DEFINITION: F-TRANSP-DECON

Connection Number	Data Transferred	Comments
D1	o Transporter ID o Objective unit ID o Current unit ID	Triggers function. Current location unit or next location unit.
S2	o Transp decon flag 0 = no decon 1 = decon when leaving 2 = decon while entering o Decon unit ID o MOPP status	Leaving and entering decon.
D3	o Objective unit ID o Objective save unit ID	Parameters returned to triggering function.

C-F16

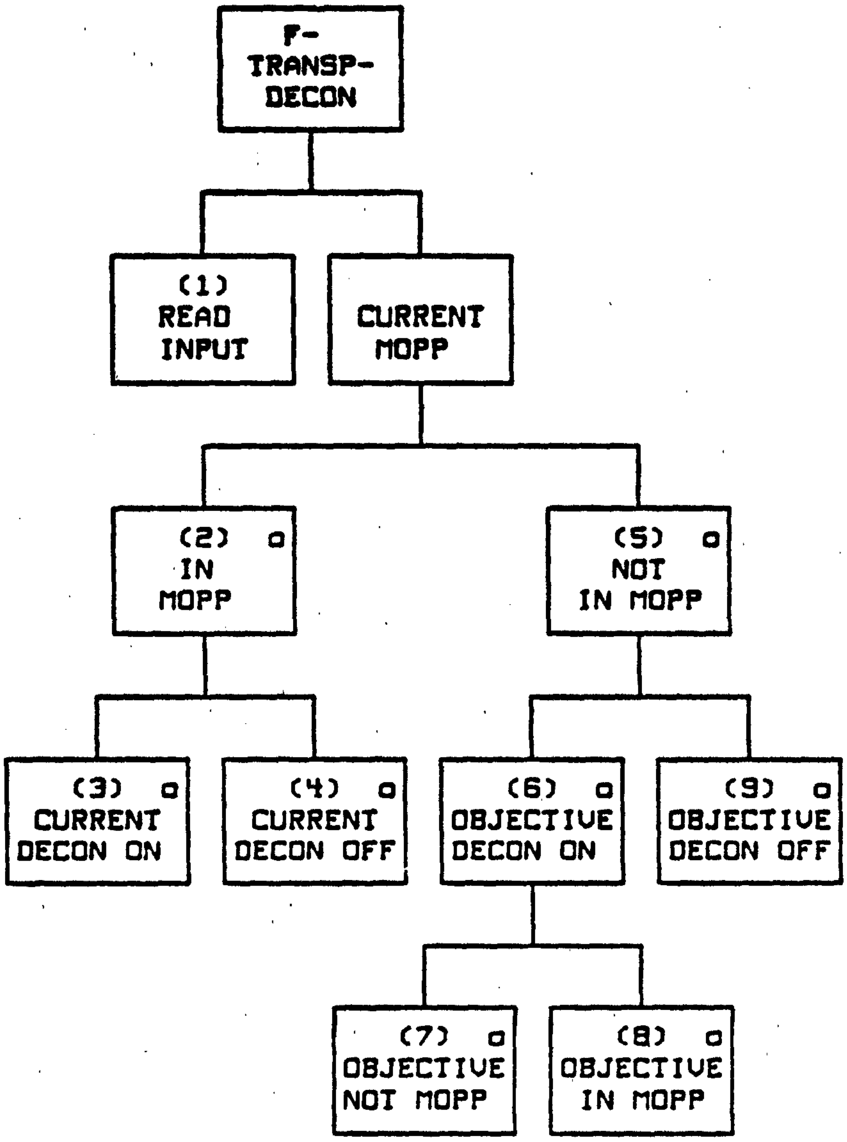

Figure C-40. F-TRANSP-DECON generator

C-F16

GENERATOR DESCRIPTION: F-TRANSP-DECON

1. READ INPUT. Read the transporter ID, its current location, and its next objective in D1.

2. CURRENT IN MOPP. The current location unit's MOPP status is checked. If the transporter is just beginning a mission, the current location would be the parent unit location; otherwise it would be the supplier, customer, or a decon unit location.

3. CURRENT DECON ON. If the unit where the transporter is currently located has its transport decon flag (S2) on, set the objective save unit ID (D3) to the objective unit ID (D1). Set the objective unit ID (D3) to the decon unit ID (S2).

4. CURRENT DECON OFF. If the unit where the transporter is currently located has its transport decon flag (S2) off, set the objective unit ID (D3) to the objective unit ID (D1). Leave the objective save unit ID (D3) blank or zero.

5. CURRENT NOT MOPP. If the current location unit's MOPP status shows the unit is not in MOPP, then the unit that the transporter is moving to must be checked also.

6. OBJECTIVE DECON ON. Determine if the transporter's objective unit has the transp decon flag on by checking S2.

7. OBJECTIVE NOT MOPP. If the objective unit is not in MOPP (S2), the transporter entering the unit must be checked for contamination. Set the objective unit ID (D3) to the decon unit ID (S2). Set the objective save unit ID (D3) to objective unit ID (D1).

8. OBJECTIVE IN MOPP. If the objective unit is in MOPP (S2), it is senseless to decon a transport before entering a contaminated unit. Set the objective unit ID (D3) to the objective unit ID (D1). Leave the objective save unit ID (D3) set to zero.

9. OBJECTIVE DECON OFF. If the objective unit does not have the transport decon flag (S2) set, then no decon is necessary before entering this unit. Set the objective unit ID (D3) to the objective unit ID (D1). Leave the save unit ID (D3) set to zero.

C-F17

C-F17 F-TRANSP-RETURN TYPE: **Interactive Function**

SUMMARY This function is triggered when a transporter has completed a mission and the maintenance delay (PM) is finished. The equipment from the temporary unit is transferred back to the parent unit and the temporary transport unit is deleted.

TRIGGERED BY:	Transportation dispatcher via F-TRANSP-PM	(C-F12)
RESULTING IN:	GND-TRANSP-EX	(C-E1)
	GND-TRANSP-SPLR	(C-E7)
	A-RECEIVE-VEHICLE	(C-A2)
	AIR-TRANSP-EX	(C-E2)
	AIR-TRANSP-SPLR	(C-E6)
	A-RECEIVE-AIRCRAFT	(C-A4)

SYSTEM SPECIFICATION DIAGRAM:

See figure C-41.

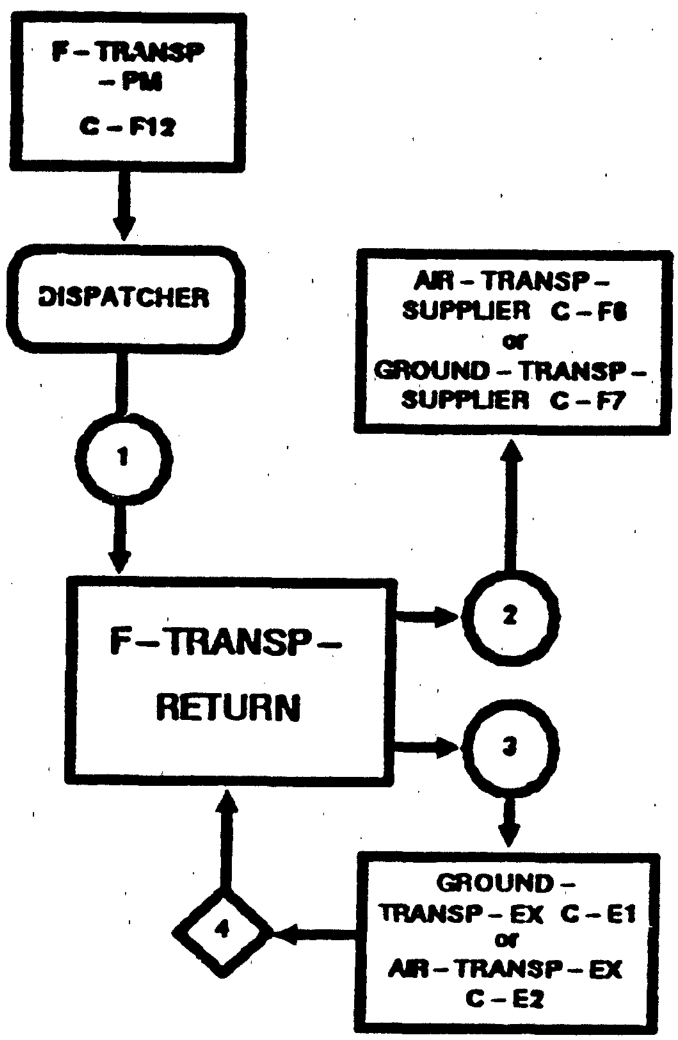

Figure C-41. F-TRANSP-RETURN SSD

DATA DEFINITION: F-TRANSP-RETURN

Connection Number	Data Transferred	Comments
D1	o Transport unit ID o Transport supplier ID	Triggers function
D2	o Transport unit ID o Equipment type o Equipment quantity o Transport supplier ID	Triggers A-RECEIVE-VEHICLE and A-RECEIVE-AIRCRAFT for the transport supplier.
D3	o Transport ID	Triggers A-RECEIVE-VEHICLE and A-RECEIVE-AIRCRAFT for the transporter
S4	o Equipment type o Equipment quantity	Transporter state vector

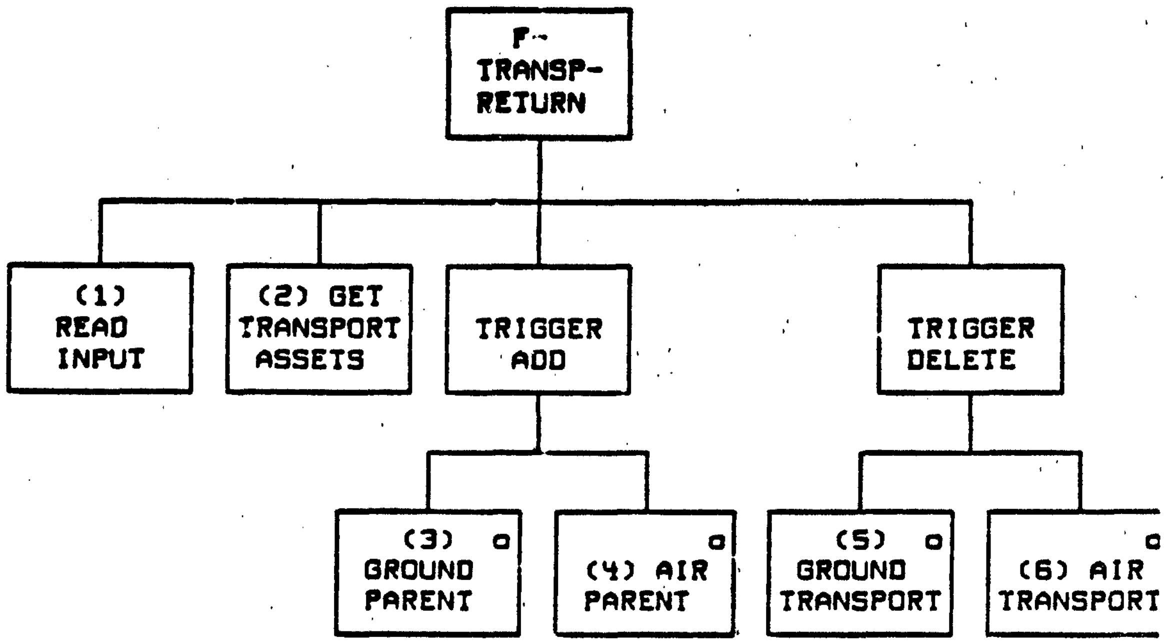

Figure C-42. F-TRANSP-RETURN generator

C-F17

GENERATOR DESCRIPTION: F-TRANSP-RETURN

1. READ INPUT. Read the transport unit ID (D1) that triggered this function.

2. GET TRANSPORT ASSETS. Obtain the type of transport assets and the quantity of each that is in the transporter unit from S4

3. GROUND PARENT. If the transportation supplier is a ground unit, trigger A-RECEIVE-VEHICLE (C-A2) for GND-TRANSP-SPLR (C-E7) using D2. This will add the assets back to the parent unit.

4. AIR PARENT. If the transportation supplier is an air unit, trigger A-RECEIVE-AIRCRAFT (C-A4) for AIR-TRANSP-SPLR (C-E6) using D2. This will add the assets back to the parent unit.

5. GROUND TRANSPORT. If the transporter is a ground convoy, trigger A-RECEIVE-VEHICLE (C-A2) for GND-TRANSP-EX (C-E1) using D3. This will delete the temporary unit.

6. AIR TRANSPORT. If the transporter is an air flight, trigger A-RECEIVE-AIRCRAFT (C-A4) for AIR-TRANSP-EX (C-E2) using D3. This will delete the temporary unit.

APPENDIX D

SUPPLY

The supply appendix includes the sections listed below. Note that reference numbers are coded to indicate both the functional area (the appendix letter is used) and the type (E = entity, A = action, F = function) involved. Thus, D-A1 refers to the first action listed in supply (appendix D). For information on the JSD diagram notation discussed, see appendix A.

1. Entity list. The entity list contains the reference number, the name, and the definition (summary and attributes) of each entity used in supply.

2. Action list. The action list contains the reference number, the name, and the definition (summary, attributes, generators and associated entities) of each action belonging to the entities in supply.

3. Entity-action diagrams and cross-reference table. The cross-reference table provides a mapping of entities and actions. One JSD entity-action structure diagram is provided for each entity. Following each diagram is a narrative description of each action shown.

4. Generator function list. The function list contains the reference number, name, and definition (summary, triggering mechanisms, and resulting actions) of each function associated with supply. More complete information on each function is contained in the annex.

5. Annex. The contents of the annex are as follows:

a. Dispatcher. The dispatcher serves as a road map to the functions. It is not a JSD structure diagram, but it is presented in tree form to show the hierarchical nature of the structure involved. The root of the tree is the dispatcher. The top-level nodes (boxes) identify the critical events occurring in supply and the subsequent nodes (boxes) identify the functions and show the interrelationships involved. The calling routines and triggering mechanisms for each critical event are listed above the event node. The actions and events caused by a function are listed below the function node. Each critical event is numbered for identification purposes only; no ordering is implied. The event scheduler (SCHED) uses the critical event numbers to identify the event being scheduled by a function.

5. Annex (cont.)

b. Functions. The following information is provided for each function belonging to supply. Note that the reference number of the function (e.g., D-F1) appears at top of each page.

(1) Function summary. The function summary contains the reference number, name, and definition of a function. The definition contains a summarized narrative, a list of the mechanisms which can trigger the function, and a list of the actions and functions which can result from the function.

(2) System specification diagram (SSD). The SSD is a JSD structure diagram of the data flow to and from a specified function. It shows the static relationships among the entities and functions involved. No calling sequence or hierarchical relationship is implied. In addition to the standard JSD SSD notation (see appendix A), special notation has been adopted to indicate ownership. A single box is used to denote a function belonging to the specified functional area (e.g., supply). Plain double boxes indicate functions belonging to another CSS area. The area is identified in the outer box and the functions involved are listed in the inner box. Patterned double boxes (diagonal slashes in the outer box) denote functions belonging to the host model. Whenever possible, the particular module is identified in the inner box. A timer is considered part of the CSS module and is represented by a plain double circle; data files (DF) will belong to the entire model and are depicted by a patterned double circle. Note that although more than one data file (or timer) may be used by the specified function, only one representation (circle) will appear in the diagram. The individual data files and timers will be identified in the corresponding data definition table.

(3) Data definition. This table provides a listing of the data elements and structures required for the specified function and comments on their usage. The connection numbers correspond to the data flow numbers shown on the SSD. A "D" or "S" is added to distinguish between data and state vector elements. Detailed descriptions of the data files involved can be found in appendices [illegible] and [illegible].

(4) Generator diagram. The generator diagram is similar to the JSD entity-action diagrams described in paragraph 3 above. Each node (box) depicts either an iteration, a selection, or a sequential step required by the process.

(5) Generator description. The generator description provides a detailed narrative of the function process. Step numbers correspond to the box numbers shown on the associated generator diagram. (Note that not all boxes are assigned a number.) Data elements cited refer to the data listed in the associated data definition table.

1. ENTITY LIST.

D-E1 SUPPLY-CUSTOMER

SUMMARY: This entity models any unit that has supply requirements. These supplies can be either for consumption or for issue to other units.

ATTRIBUTES:

Unit ID	Unit type (SRC)
Echelon	Side
Supply data	OPCODE
Supplier IDs	MSNCODE
Systems data	Combat flag
Combat effectiveness	Systems effectiveness
Personnel effectiveness	Personnel data
MOPP posture	Contamination level
Movement flag	Location
Deployment flag	

D-E2 SUPPLIER

SUMMARY: This entity models any unit that has the responsibility of providing resupply support to other units. The supported units are SUPPLY-CUSTOMERs that need supplies for their own use (user units) or for issue (supply bases) to their supported units.

ATTRIBUTES:

Unit ID	Unit type (SRC)
Echelon	Side
Supply data	OPCODE
Supplier IDs	MSNCODE
Systems data	Combat flag
Combat effectiveness	Systems effectiveness
Personnel effectiveness	Personnel data
MOPP posture	Contamination level
Movement flag	Location
Deployment flag	

D-E3 ALLOCATION

SUMMARY: This entity represents supplies reserved for issue to a SUPPLY-CUSTOMER resulting from a special request or a request requiring command approval.

ATTRIBUTES:

ALLOCATION ID	SUPPLIER ID
SUPPLY-CUSTOMER ID	Supplies required
Supplies committed	

2. ACTION LIST.

D-A1 PLACE ORDER (A-PLACE-ORDER)

SUMMARY: The SUPPLY-CUSTOMER (D-E1) sends his supply order and updates his supply status for the amount of each supply item expected (due-in).

ATTRIBUTES:	SUPPLY-CUSTOMER ID	Supply order
	SUPPLY-CUSTOMER supply data	
GENERATOR:	F-RO-RQMT	(D-F4)
	F-C2-MEI	(D-F7)
ENTITY:	SUPPLY-CUSTOMER	(D-E1)

D-A2 BEGIN LOAD (A-BEGIN-LOAD)

SUMMARY: A SUPPLIER (D-E2) begins loading the supply order onto the cargo vehicles of a supply transport unit (TU).

ATTRIBUTES:	SUPPLIER ID	TU ID
	Job lift requirement	Storage capability
	Storage requirement	
	Temporary storage flag	
	SUPPLIER available lift capability	
GENERATOR:	F-JOB-LIFT	(D-F16)
ENTITY:	SUPPLIER	(D-E2)
	GROUND-TRANSP-EX	(C-E1)
	AIR-TRANSP-EX	(C-E2)

D-A3 END LOAD (A-END-LOAD)

SUMMARY: A SUPPLIER (D-E2) finishes loading the supplies onto the cargo vehicles of a TU.

ATTRIBUTES:	SUPPLY-CUSTOMER ID	SUPPLIER ID
	SUPPLIER inventory	TU ID
	TU inventory	Fill list
GENERATOR:	Clock scheduler	
	F-ARRIVE-CUSTOMER	(D-F17)
ENTITY:	SUPPLIER	(D-E2)
	GROUND-TRANSP-EX	(C-E1)
	AIR-TRANSP-EX	(C-E2)

D-A4 BEGIN UNLOAD (A-BEGIN-UNLOAD)

SUMMARY: The SUPPLY-CUSTOMER begins unloading and/or storing the cargo received on a TU.

ATTRIBUTES: SUPPLY-CUSTOMER ID   TU ID
Job lift requirement
Job storage requirement
SUPPLY-CUSTOMER available lift capability
SUPPLY-CUSTOMER storage capability

GENERATOR: F-ARRIVE-CUSTOMER (D-F17)

ENTITY: SUPPLY-CUSTOMER ID (D-E1)
GROUND-TRANSP-EX (C-E1)
AIR-TRANSP-EX (C-E2)

D-A5 END UNLOAD (A-END-UNLOAD)

SUMMARY: A SUPPLY-CUSTOMER finishes unloading and/or storing the cargo received on a TU.

ATTRIBUTES: SUPPLY-CUSTOMER ID   TU ID
Supplies unloaded/stored   TU cargo inventory
SUPPLY-CUSTOMER supply inventory
SUPPLY-CUSTOMER storage capability

GENERATOR: Clock scheduler

ENTITY: SUPPLY-CUSTOMER (D-E1)
GROUND-TRANSP-EX (C-E1)
AIR-TRANSP-EX (C-E2)

D-A6 CREATE ALLOCATION (A-CREATE-ALLOC)

SUMMARY: A special supply order is placed in a reserved status for a specific SUPPLY-CUSTOMER.

ATTRIBUTES: SUPPLY-CUSTOMER ID   SUPPLIER ID
SUPPLIER inventory   ALLOCATION file
Special supply order list
CUSTOMER supply inventory

GENERATOR: F-JF-RQMT (D-F6)   F-C2-MEI (D-F7)

ENTITY: SUPPLY-CUSTOMER (D-E1)
SUPPLIER (D-E2)
ALLOCATION (D-E3)

D-A7 COMMIT TO ALLOCATION (A-COMMIT-ALLOC)

SUMMARY: An ALLOCATION is updated when supplies or personnel needed by the ALLOCATION are committed to it. Part fill may mean complete fill if no more fill requirement remains in the ALLOCATION.

ATTRIBUTES:	Current owning unit ID	ALLOCATION ID
	ALLOCATION supply base ID	
	Supply requirements fill list	
GENERATOR:	F-ARRIVE-SUPPLIER	(D-F12)
	F-C2-MEI	(D-F7)
	F-ARRIVE-CUSTOMER	(D-F17)
ENTITY:	SUPPLY-CUSTOMER	(D-E1)
	SUPPLIER	(D-E2)
	ALLOCATION	(D-E3)

D-A8 BEGIN LOADING ALLOCATION (A-BEGIN-LOAD-ALLOC)

SUMMARY: Begin loading the supplies currently available and committed to an ALLOCATION onto a TU for delivery to the owning SUPPLY-CUSTOMER.

ATTRIBUTES:	SUPPLIER ID	ALLOCATION ID
	Job lift requirement	TU ID
	Temporary storage flag	Storage requirement
	SUPPLIER available lift capability	
	SUPPLIER storage capability per supply type	
GENERATOR:	F-ARRIVE-SUPPLIER	(D-F12)
ENTITY:	SUPPLIER	(D-E2)
	ALLOCATION	(D-E3)

D-A9 END LOADING ALLOCATION (A-END-LOAD-ALLOC)

SUMMARY: End loading the supplies onto the transport unit. This action occurs when the ALLOCATION still has requirements to be filled.

ATTRIBUTES:	TU ID	TU cargo data
	Supply order	SUPPLIER ID
	ALLOCATION inventory data	ALLOCATION ID
	SUPPLIER inventory data	
GENERATOR:	F-ARRIVE-SUPPLIER	(D-F12)
ENTITY:	SUPPLIER	(D-E2)
	ALLOCATION	(D-E3)

D-A10 FINISH ALLOCATION (A-FINISH-ALLOC)

SUMMARY: End loading the supplies onto the transport unit. This action occurs when the ALLOCATION is completed with no remaining requirements to fill.

ATTRIBUTES:	TU ID	TU cargo data
	Supply order	SUPPLIER ID
	SUPPLIER inventory data	
	ALLOCATION supply data	ALLOCATION ID
GENERATOR:	F-ARRIVE-SUPPLIER	(D-F12)
ENTITY:	SUPPLIER	(D-E2)
	ALLOCATION	(D-E3)

D-A11 CANCEL ALLOCATION (A-CANCEL-ALLOC)

SUMMARY: An ALLOCATION is canceled if not picked up by the SUPPLY-CUSTOMER after a period of time.

ATTRIBUTES:	SUPPLY-CUSTOMER ID	SUPPLIER ID
	ALLOCATION supply data	ALLOCATION ID
	SUPPLY-CUSTOMER inventory	
	SUPPLIER inventory	
GENERATOR:	Clock scheduler	
ENTITY:	SUPPLY-CUSTOMER	(D-E1)
	SUPPLIER	(D-E2)
	ALLOCATION	(D-E3)

D-A12 LOSE ORDER (A-LOSE-ORDER)

SUMMARY: The SUPPLY-CUSTOMER adjusts the size of the order when the convoy has been interdicted enroute. Only the carrying capacity is lost going to the SUPPLIER; both carrying capacity and supplies are lost returning to the SUPPLY-CUSTOMER.

ATTRIBUTES: SUPPLY CUSTOMER ID SUPPLIER ID
Controlled supply item issue TU ID
TU vehicle data TU vehicles lost

GENERATOR: F-ARRIVE-SUPPLIER (D-F12)
F-TU-LOSSES (D-F13)

ENTITY: SUPPLY-CUSTOMER (D-E1)
GROUND-TRANSP-EX (C-E1) Transportation
AIR-TRANSP-EX (C-E2) Transportation

D-A13 CONSUME SUPPLY (A-CONSUME-SUPPLY)

SUMMARY: Supply types that are consumed over a period of time and are accounted for periodically are adjusted using this action.

ATTRIBUTES: SUPPLY-CUSTOMER ID Supplies consumed
SUPPLY CUSTOMER supply inventory

GENERATOR: F-FUEL-USED (D-F2) F-PF-RQMT (D-F5)

ENTITY: SUPPLY-CUSTOMER (D-E1)

D-A14 SUPPLY ALLOCATION (A-SUPPLY-ALLOC)

SUMMARY: When the supplies and fuel required by WSRO systems are not available at the WSRO supply base, they are obtained from the WSRO supply base's assigned SUPPLIERs when enough non-committed, required supplies are available. The supplies are transfered implicitly as if the WSRO crews went after them.

ATTRIBUTES: MEI SUPPLIER ID ALLOCATION ID
ALLOCATION supply data Supplies transferred
MEI supply base inventory
Assigned SUPPLIER IDs
Ammo/fuel supply base inventories

GENERATOR: F-WSRO-SPLY-AVL (D-F9)

ENTITY: SUPPLIER (D-E2) ALLOCATION (D-E3)

3. ENTITY-ACTION CROSS-REFERENCE TABLE AND DIAGRAMS.

ENTITY		ACTION	
SUPPLY-CUSTOMER	(D-E1)	A-CONSUME-SUPPLY	(D-A13)
		A-PLACE-ORDER	(D-A1)
		A-BEGIN-UNLOAD	(D-A4)
		A-END-UNLOAD	(D-A5)
		A-LOSE-ORDER	(D-A12)
		A-CREATE-ALLOC	(D-A6)
		A-CANCEL-ALLOC	(D-A11)
SUPPLIER	(D-E2)	A-BEGIN-LOAD	(D-A2)
		A-END-LOAD	(D-A3)
		A-CREATE-ALLOC	(D-A6)
		A-COMMIT-ALLOC	(D-A7)
		A-BEGIN-LOAD-ALLOC	(D-A8)
		A-END-LOAD-ALLOC	(D-A9)
		A-FINISH-ALLOC	(D-A10)
		A-CANCEL-ALLOC	(D-A11)
		A-SUPPLY-ALLOC	(D-A14)
ALLOCATION	(D-E3)	A-CREATE-ALLOC	(D-A6)
		A-COMMIT-ALLOC	(D-A7)
		A-BEGIN-LOAD-ALLOC	(D-A8)
		A-END-LOAD-ALLOC	(D-A9)
		A-FINISH-ALLOC	(D-A10)
		A-CANCEL-ALLOC	(D-A11)
		A-SUPPLY-ALLOC	(D-A14)

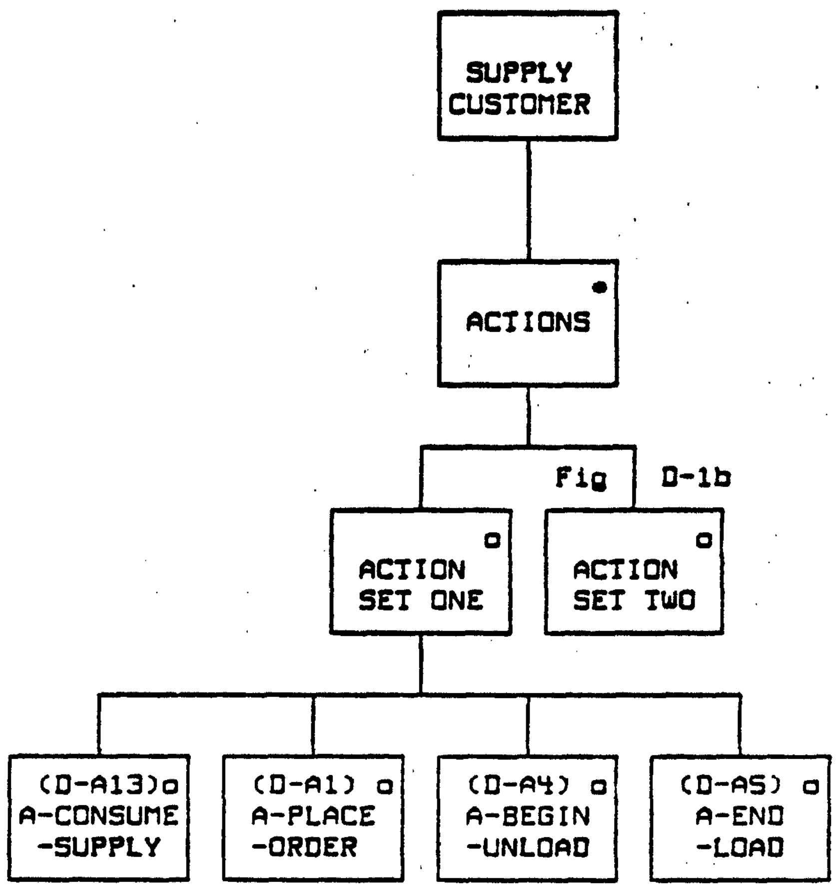

Figure D-1a. Entity-action diagram for SUPPLY-CUSTOMER

D-E1

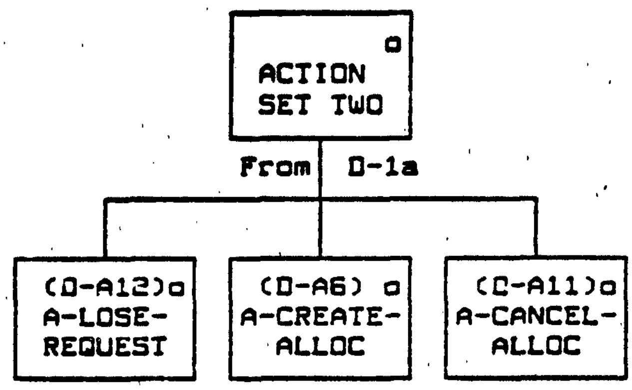

Figure D-1b. Entity-action diagram for SUPPLY-CUSTOMER (continued)

ENTITY-ACTION DESCRIPTION: SUPPLY-CUSTOMER (D-E1)

1. SUPPLY-CUSTOMER. The supply-related actions that a SUPPLY-CUSTOMER performs or experiences (suffers) are discussed in the following paragraphs. (Note: There are many other actions that this unit may perform or experience, but they are in roles other than that of SUPPLY-CUSTOMER, such as: MOVER, SUPPLIER, VICTIM, etc. However, because the Mod II CSS module, designed using JSD, is to be added to already existing corps/division-level models designed using other techniques, the non-CSS roles are treated implicitly and any CSS actions they contain (such as the depletion of ammunition) take place elsewhere in the model. In order to avoid excessive redesign of the host models, these actions have not been drawn into the set of actions that CSS entities might perform or experience. The only possible consequence, known at this time, is greater difficulty in the gathering of the effects on CSS entities for post-processing.)

2. A-CONSUME-SUPPLY (D-A13). The depletion of several supply types is not explicitly represented in a corp/division level model. These include all of the PF supply types, which are in the real world and consumed over time, such as food and clothing, but most importantly, fuel. In order to account for these supply types, the supply consumption is determined using planning factors (PF) based on rates of consumption per person or per system for an elapsed time period. This action is triggered by the functions, F-FUEL-USED (D-F2) and F-PF-RQMT (D-F5), which calculate the amount consumed by the unit. The A-CONSUME-SUPPLY action then reduces the unit's on-hand stocks by the amount consumed. For PF supply types, this may be either one big reduction in short tons available or an amount for each individual item; for fuel, the calculated consumption will be a reduction in the amount of each fuel type available at the unit. The information needed includes:

- SUPPLY CUSTOMER ID
- SUPPLY CUSTOMER supply inventory
- Supplies consumed

The amount of supplies consumed is calculated in the triggering function and is passed to the action routine to update (reduce) the SUPPLY-CUSTOMER inventory.

SUPPLY-CUSTOMER (D-E1) (cont.)

3. A-PLACE-ORDER (D-A1). This action is triggered when a resupply order is created and transportation support is requested and accepted. It updates (increases) the SUPPLY-CUSTOMER's due-in amount of each supply item requested by the amount requested. A reduction in supply shortage must be accounted for at order time to avoid having the unit attempt to reorder the supplies before they can be delivered and added to the inventory. Information needed includes:

- o SUPPLY-CUSTOMER ID
- o SUPPLY-CUSTOMER supply data
- o Supply order

The supply order information is determined by the triggering function and is passed to the A-PLACE-ORDER action routine. The unit supply due-in is increased by the amount of each type of supply ordered.

4. A-BEGIN-UNLOAD (D-A4). This action is selected when a supply transportation unit (TU) arrives with cargo for the SUPPLY-CUSTOMER entity and it becomes necessary to update (reduce) the unit's storage status (for supply types that require storage) and lift capability (for a supply base). The work assets are assigned at this time based on the order's priority; they can be changed if the order priorities change. The unit's storage capability for the supply type is decreased by the amount of the job's storage requirement up to the amount of the unit's permanent storage capability. The data needed for this action include:

- o SUPPLY-CUSTOMER ID
- o TU ID
- o SUPPLY-CUSTOMER available lift capability
- o SUPPLY-CUSTOMER storage capability
- o Job lift requirement
- o Job storage requirement

(Note: The storage and work asset constraints are applied to the job by the triggering routine so the job size is already constrained. The inventory for the units does not change until the unload is completed by A-END-UNLOAD.)

SUPPLY-CUSTOMER (D-E1) (cont.)

5. A-END-UNLOAD (D-A5). This action is selected after the time required for unloading the TU has elapsed. It now becomes necessary to update (increase) the unit's inventory of supplies on-hand for each supply item unloaded by the amount unloaded.

- SUPPLY-CUSTOMER ID
- SUPPLY-CUSTOMER supply inventory
- SUPPLY-CUSTOMER supply storage capability
- TU ID
- TU cargo inventory
- Supplies unloaded

6. A-LOSE-ORDER (D-A12). This action is triggered when an interdicted supply TU arrives at a SUPPLIER or SUPPLY-CUSTOMER unit. It is necessary to adjust the size of the order that the TU went after or delivered because of losses in supplies and/or carrying capacity. The order delivered to the supply base to be filled should not be greater than the TU has carrying capacity. The same is true of deliveries made to the receiving unit. The information required includes:

- SUPPLY CUSTOMER ID
- SUPPLIER ID
- TU ID
- Controlled supply item issue
- TU vehicle data
- TU vehicles lost

Not only is the order reduced by the fraction of cargo vehicles lost, but the authorized amount of each cargo vehicle type is reduced to the amount on-hand so that any interdiction that occurs to the TU during the next leg of its trip can be easily discerned and accounted for.

7. A-CREATE-ALLOC (D-A6). See this action in the ALLOCATION (D-E3) Entity-Action Description and figure D-3 for a complete description.

8. A-CANCEL-ALLOC (D-A11). See this action in the ALLOCATION (D-E3) Entity-Action Description and accompanying figure D-3 for a complete description.

D-E2

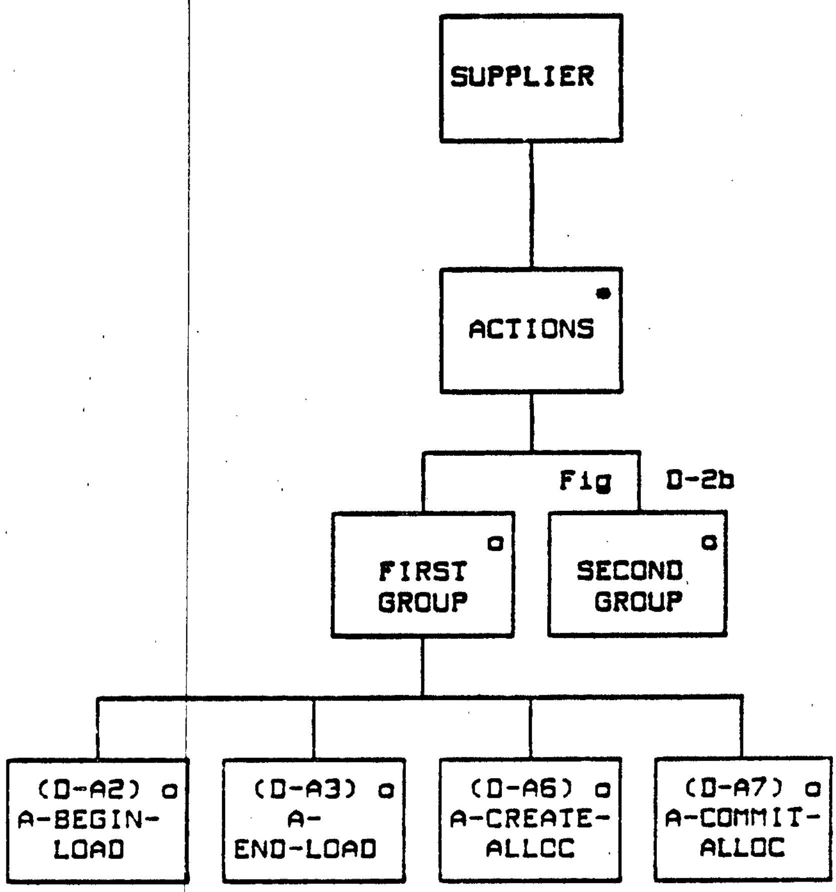

Figure D-2a. Entity-action diagram for SUPPLIER

<u>D-E2</u>

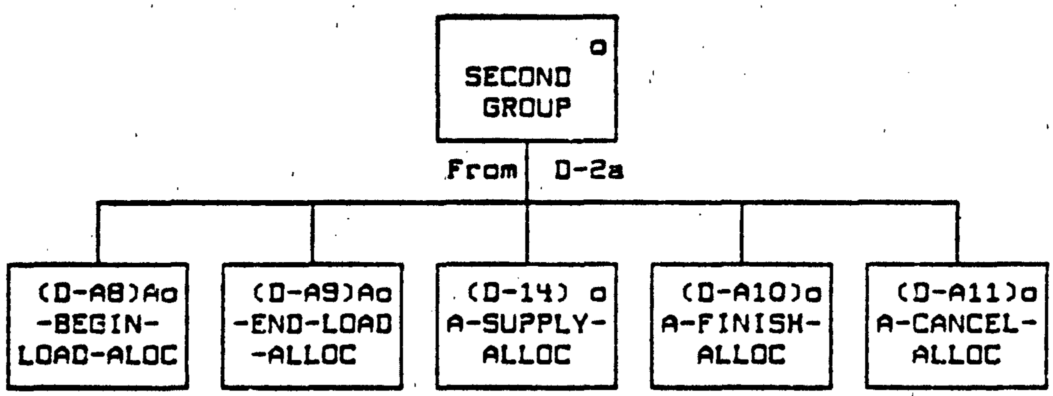

Figure D-2b. Entity-action diagram for SUPPLIER (continued)

ENTITY-ACTION DESCRIPTION: SUPPLIER (D-E2)

1. SUPPLIER. The supply-related actions which the SUPPLIER entity performs or experiences (suffers) are discussed below:

2. A-BEGIN-LOAD (D-A2). This action is selected when a SUPPLIER has checked his capability to fill a supply order (in terms of lift capacity and supplies available) and begins loading all or part of the order onto a convoy. The information needed contains:

- o SUPPLIER ID
- o SUPPLIER available lift capability
- o TU ID
- o Job lift requirement
- o Storage requirement per supply type
- o Storage capability per supply type
- o Temporary storage flag for the supply type

This action updates (reduces) the SUPPLIER's lift capability currently available by the amount of the lift requirement to do the load job. If the supplies require storage, the temporary storage flag is checked. If it is set, the supplies are to be taken from temporary storage first, then from permanent storage as necessary.

3. A-END-LOAD (D-A3). The same function that triggers A-BEGIN-LOAD schedules this action based on the expected time to complete the load job, given the amount of lift capability assigned and the job requirement. The data needed includes:

- o SUPPLY-CUSTOMER ID
- o SUPPLIER ID
- o SUPPLIER inventory
- o TU ID
- o TU inventory

This action updates (reduces) the SUPPLIER's and (increases) the TU's supplies on-hand.

4. A-CREATE-ALLOC (D-A6). Read this action discussion in the ALLOCATION (D-E3) Entity-Action Description.

5. A-COMMIT-ALLOC (D-A7). Read this action discussion in the ALLOCATION (D-E3) Entity-Action Description.

6. A-BEGIN-LOAD-ALLOC (D-A8). Read this action discussion in the ALLOCATION (D-E3) Entity-Action Description.

7. A-END-LOAD-ALLOC (D-A9). Read this action discussion in the ALLOCATION (D-E3) Entity-Action Description.

SUPPLIER (D-E2) (cont.)

8. A-FINISH-ALLOC (D-A10). Read this action discussion in the ALLOCATION (D-E3) Entity-Action Description.

9. A-CANCEL-ALLOC (D-A11). Read this action discussion in the ALLOCATION (D-E3) Entity-Action Description.

10. A-SUPPLY-ALLOC (D-14). Read this action discussion in the ALLOCATION (D-E3) Entity-Action Description.

D-E3

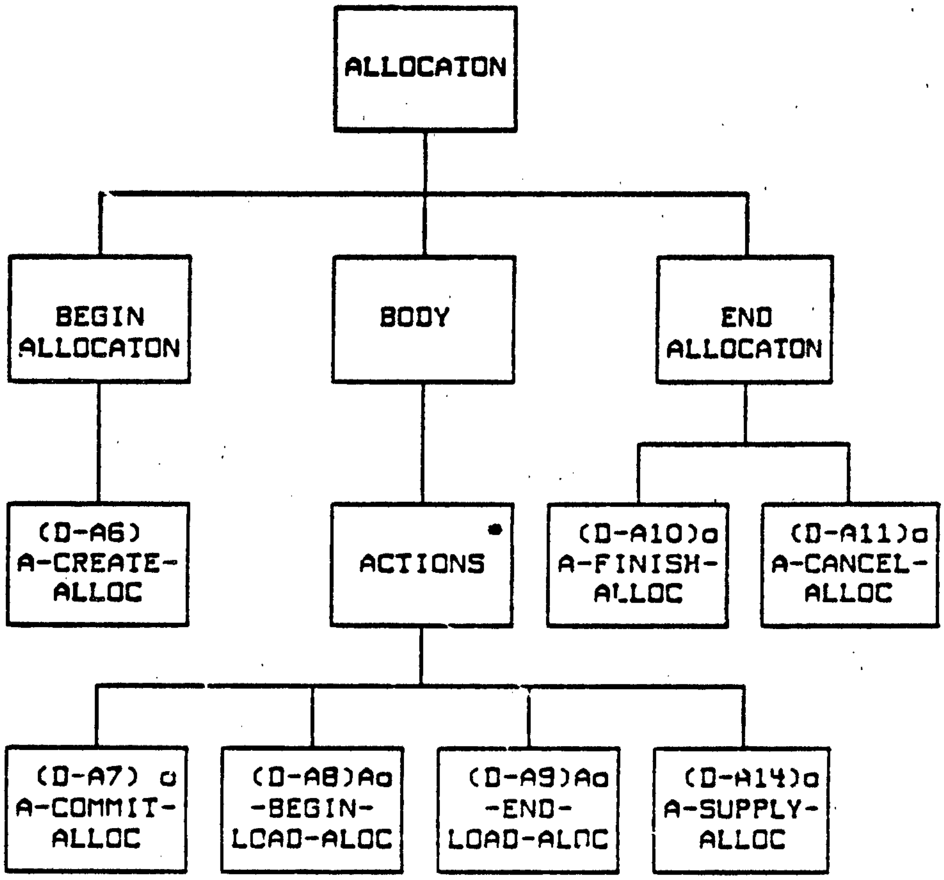

Figure D-3. Entity-action diagram for ALLOCATION

ENTITY-ACTION DESCRIPTION: ALLOCATION (D-E3)

1. ALLOCATION. All of the actions that are experienced by an ALLOCATION are diagrammed in figure D-3 and discussed in the following paragraphs.

2. A-CREATE-ALLOC (D-A6). This action occurs whenever a special order is received and placed in a reserve status for a specific SUPPLY-CUSTOMER. The special order typically results from receiving an order setup by a job fill (JF) supply requirement (see function F-JF-RQMT, D-F6 for details) or an MEI requisition (see function F-C2-MEI, D-F7 for details). The information needed by the action includes:

- o SUPPLY-CUSTOMER ID
- o SUPPLIER ID
- o Special supply order
- o SUPPLIER inventory
- o CUSTOMER supply inventory
- o ALLOCATION file

The ALLOCATION is a special order record in a file of ALLOCATIONs at a supply base. The first record of the file is not an order: it is a bookkeeping record of the totals of the supplies required and committed to all of the ALLOCATIONs on file at the SUPPLIER. None of the supplies are actually transferred from the SUPPLIER to the ALLOCATION. (Note: The original supply requirement is kept untouched in the ALLOCATION. The unfilled requirement per item is the difference in the required and the committed amounts. This could be saved as part of the record instead of recalculating it each time.) The action updates the following:

o The list of active ALLOCATIONs by placing the special supply order requirements in a vacant record and assigning it an ID.

o Any of the required supplies available at the SUPPLIER (D-E1) which are moved from the supplies available column to the supplies committed column.

o The supplies committed to the ALLOCATION recorded in the ALLOCATIONs record and added into the total for each supply item in the bookkeeping (first) record.

o The supplies in the supply order added to the SUPPLY-CUSTOMER's due-in amount for each item.

ALLOCATION (D-E3) (cont.)

3. A-COMMIT-ALLOC (D-A7). This action is selected when the supplies that are part of the ALLOCATION requirement arrive either at the SUPPLIER (D-E2) where the ALLOCATION resides or at the suppliers of this supply base. The required information includes:

- o Arriving supply base ID
- o ALLOCATION supply base ID
- o ALLOCATION ID
- o ALLOCATION supply requirements fill

The function that triggers this action has already checked the arriving supplies against those required by the ALLOCATION and it has determined the fill amounts, if any. This action updates the following by the amount of the fill for each supply item:

- o The arriving supply base supplies on-hand (reduced).
- o The SUPPLIER's committed supplies (increased).
- o The total committed in record 1 (increased).
- o The committed at the ALLOCATION (increased).

4. A-BEGIN-LOAD-ALLOC (D-A8). This action is selected when the transportation arrives to pick up the committed (available) part of an ALLOCATION. This differs from A-BEGIN-LOAD (D-A2) because the supplies are reserved and committed to an ALLOCATION so a different set of entities and actions is involved. The information required involves:

- o SUPPLIER unit ID
- o ALLOCATION ID
- o TU ID
- o Job lift requirement
- o Storage requirement
- o SUPPLIER available lift capability
- o SUPPLIER storage capability per supply type
- o Temporary storage flag

The triggering function already matched the arriving supply order with the amount committed and available. It figured the lift requirement and determined the amount of the SUPPLIER's lift assets to assign to the load job. This action reduces the SUPPLIER's lift capability. If the supply type requires storage, the temporary storage flag is checked. If it is set, the supplies are removed first from temporary storage, thereby emptying the temporary storage. Any remaining supplies are then removed from permanent storage, thereby increasing the permanent storage available.

ALLOCATION (D-E3)

5. A-END-LOAD-ALLOC (D-A9). This action is scheduled at the same time that the A-BEGIN-LOAD-ALLOC is triggered. The length of time that elapses before this action is triggered depends on the lift requirement of the job and the work assets that the SUPPLIER can make available. The information needed includes:

- o TU ID
- o TU cargo data
- o Supply order
- o SUPPLIER ID
- o SUPPLIER inventory data
- o ALLOCATION ID
- o ALLOCATION inventory data

The action updates the following by the amount of each item loaded:

- o The SUPPLIER's inventory committed (reduced).
- o The ALLOCATION's supplies committed (reduced).
- o The total supplies committed in record 1 of the ALLOCATION file (reduced).
- o The TU's cargo on-hand (increased).

6. A-SUPPLY-ALLOC (D-A14). This action is triggered when an ALLOCATION is created for WSRO supplies. Its purpose is to get any necessary supporting supplies (ammunition/fuel) for the WSRO systems not at the MEI supply base from the assigned local suppliers and put them into the ALLOCATION for the WSRO order so as many "ready-to-fight" WSRO systems as possible can be shipped ASAP. The information needed includes:

- o MEI supply base ID
- o MEI supply base inventory
- o Assigned ammo/fuel suppliers IDs
- o Ammo/fuel supply base inventories
- o ALLOCATION ID
- o ALLOCATION supply data
- o Supplies transferred

The triggering function (F-WSRO-SPLY-AVL, D-F10) has already found the available supplies. The action updates the following based on the supply amounts available at the SUPPLIERs:

- o The supplies on-hand at the ammo/fuel SUPPLIERs (reduced).
- o The amount committed to ALLOCATIONs at the MEI SUPPLIER (increased).
- o The total amounts committed to ALLOCATIONs in the bookkeeping record (1) of the ALLOCATION file (increased).
- o The recorded supply amounts committed to the ALLOCATION in its own record (increased).

ALLOCATION (D-23) (cont.)

7. A-FINISH-ALLOC (D-A10). This action is similar to the A-END-LOAD-ALLOC (D-9) except that it is selected when the triggering function determines that the amount to be picked up completes the ALLOCATION and there is no further need to maintain it.

- o TU ID
- o TU cargo data
- o Supply order
- o SUPPLIER ID
- o SUPPLIER inventory data
- o ALLOCATION ID
- o ALLOCATION supply data

The action frees the record space by removing it from the active ALLOCATION file and updates the following by the amount of the supplies loaded:

- o The SUPPLIER's supply inventory committed (reduced).
- o The total supplies committed in record 1 of the ALLOCATION file (reduced).
- o The TU's cargo on-hand (increased).

8. A-CANCEL-ALLOC (D-A11). This action occurs when the specified time, assigned when the ALLOCATION was created, elapses. Its primary purpose is to remove the ALLOCATION, move any supplies committed to it to the SUPPLIER's supply inventory, and alter the SUPPLY-CUSTOMER's due-in accounts so he will no longer expect the order and will be able to reorder if he wishes. The information needed includes:

- o SUPPLY-CUSTOMER ID
- o SUPPLY-CUSTOMER inventory
- o SUPPLIER ID
- o SUPPLIER inventory
- o ALLOCATION ID
- o ALLOCATION supply data

The action zeros out the ALLOCATION record and updates the following:

- o The total committed in record 1 by the amount committed to the ALLOCATION (reduced).
- o The SUPPLIER's committed amount per item (reduced) and his on-hand amount (increased) by the amount committed to the ALLOCATION.
- o The amount due-in at the SUPPLY-CUSTOMER (reduced) by the amount of unfilled requirement in the ALLOCATION.

4. GENERATOR FUNCTION LIST.

D-F1 F-RO-RQMT

SUMMARY: This function determines the status of RO supply types. If the supply type is fuel, the fuel consumption algorithm (F-FUEL-USED, D-F2) is called to determine unit consumption and remove it from the unit's stocks. Supplies are checked by another algorithm (F-RO-SUPPLYCK, D-F3) which, if required, calls the function that creates and sends the order (F-RO-ORDER, D-F4).

TRIGGERED BY: Any user unit, any module, or the SCHEDULER

RESULTING IN: F-FUEL-USED (D-F2)
F-RO-SUPPLYCK (D-F3)
Scheduler

D-F2 F-FUEL-USED

SUMMARY: This function determines the amount of fuel by type that a unit has consumed since its last fuel assessment and triggers the action A-SUPPLY-CONSUMED (D-A13) which takes the amount consumed out of the unit's fuel assets.

TRIGGERED BY: F-RO-RQMT (D-F1)

RESULTING IN: SUPPLY-CUSTOMER (D-E1)
A-CONSUME-SUPPLY (D-A13)

D-F3 F-RO-SUPPLYCK

SUMMARY: This function checks the status of an RO supply type for a unit to determine if a supply request should be sent. Quantities on-hand and due-in for each item of the supply type are checked against resupply thresholds to determine what action should be taken. All major end items (MEI) short of the assigned number are reported as battle losses.

TRIGGERED BY: F-RO-RQMT (D-F1)

RESULTING IN: F-RO-ORDER (D-F4)

D-F4 F-RO-ORDER

SUMMARY: MEI loss reports are sent to headquarters via COMMO for a requisition decision. Other supply orders are submitted to the requesting unit for transportation support.

TRIGGERED BY:	F-RO-SUPPLYCK	(D-F3)	
RESULTING IN:	SUPPLY-CUSTOMER	(D-E1)	
	A-PLACE-ORDER	(D-A1)	
	F-CREATE-RQST	(C-F1)	Transportation
	F-DIRECT-RQST	(C-F2)	Transportation
	(COMMO implied action: A-SEND-MESSAGE)		

D-F5 F-PF-RQMT

SUMMARY: This function determines a unit's supply requirements for its supply types accounted for through planning factors (PF) and requests transportaion support for supply pickup and delivery.

TRIGGERED BY:	SCHEDULER (Default: 24 hours)		
RESULTING IN:	SUPPLY-CUSTOMER	(D-E1)	
	A-CONSUME-SUPPLY	(D-A13)	
	A-PLACE-ORDER	(D-A1)	
	F-CREATE-RQST	(C-F1)	Transportation
	F-DIRECT-RQST	(C-F2)	Transportation

D-F6 F-JF-RQMT

SUMMARY: This function is triggered by a special job order through COMMO from the gamer or requesting unit or by the scheduler (when a special order previously entered continues being sent on a periodic basis). It reserves the special order at the sending unit and places an order from the sending unit's SUPPLIER for those requested supplies not available or due-in.

TRIGGERED BY:	A COMMO message	SCHEDULER	
RESULTING IN:	SUPPLY-CUSTOMER	(D-E1)	
	SUPPLIER	(D-E2)	
	ALLOCATION	(D-E3)	
	A-CREATE-ALLOC	(D-A6)	
	SUPPLY-CUSTOMER	(D-E1)	
	A-PLACE-ORDER	(D-A1)	
	F-CREATE-RQST	(C-F1)	Transportation
	Schedule F-JF-RQMT	(D-F6)	

D-F7 F-C2-MEI

SUMMARY: This function is prompted an hour (default) after the last MEI battle loss report is sent by a manuevar unit. At that time, each unit's MEI loss report is reviewed and a decision is made concerning requisitioning lost MEI.

TRIGGERED BY: Prompted by the SCHEDULER

RESULTING IN:	SUPPLY-CUSTOMER	(D-E1)	
	SUPPLIER	(D-E2)	
	ALLOCATION	(D-E3)	
	A-CREATE-ALLOC	(D-A6)	
	SUPPLY-CUSTOMER	(D-E1)	
	A-PLACE-ORDER	(D-A1)	
	SUPPLIER	(D-E2)	
	ALLOCATION	(D-E3)	
	A-COMMIT-ALLOC	(D-A7)	
	A-SUPPLY-ALLOC	(D-A14)	
	F-SUPPLY-RQST	(D-F11)	
	F-WSRO-SPLY-RQD	(D-F8)	
	F-WSRO-SPLY-AVL	(D-F9)	
	F-WSRO	(E-F2)	Personnel
	F-SHIP-AVAIL	(D-F10)	
	F-CREATE-TASK	(C-F1)	Transportation

D-F8 F-WSRO-SPLY-RQD

SUMMARY: This function checks through the list of MEI on a unit's requisition for the purpose of finding WSRO systems. If WSRO MEI are part of the requisition, it finds the ammunition/ fuel supplies they normally require.

TRIGGERED BY: F-C2-MEI (D-F7)

RESULTING IN: Lists of WSRO MEI, non-WSRO MEI, ammunition and fuel requirements

D-F9 F-WSRO-SPLY-AVL

SUMMARY: This function checks the availability of a required WSRO supply component (ammunition or fuel) at the MEI supply base. If the amount available is not enough, an attempt is made to get the remaining requirement from the MEI supply base's ammunition/fuel supplier. Any of the required supply available is committed to the ALLOCATION on the update list.

TRIGGERED BY:	F-C2-MEI	(D-F7)
RESULTING IN:	SUPPLIER	(D-E2)
	ALLOCATION	(D-E3)
	A-COMMIT-ALLOC	(D-A7)
	A-SUPPLY-ALLOC	(D-A14)

D-F10 F-SHIP-AVAIL

SUMMARY: This function determines the amount of an ALLOCATION that is available for immediate shipment and creates the shipment order. It includes any non-WSRO MEI and any complete "ready to fight" (armed, fueled, and crewed) WSRO MEI.

TRIGGERED BY:	F-C2-MEI	(D-F7)	
RESULTING IN:	F-CREATE-TASK	(C-F1)	Transportation

D-F11 F-SUPPLY-RQST

SUMMARY: This process function cycles through the [illegible] requested by a SUPPLY-CUSTOMER. It checks the availability at the SUPPLIER and the control status of each item. It then validates (i.e., makes necessary changes to) the initial request, including making substitutions, when available.

TRIGGERED BY:	F-C2-MEI	(D-F7)
	F-NONALLOC-ORDER	(D-F15)

RESULTING IN: A validated fill list and/or a no fill list.

D-F12 F-ARRIVE-SUPPLIER

SUMMARY: This function simulates the arrival and servicing of a transport unit (TU) at a SUPPLIER (D-E2). The TU delivers a supply request for a SUPPLY-CUSTOMER, a user unit, or a supply base.

TRIGGERED BY:	F-ATOBJ-GRND	(C-F10)	Transportation
	F-ATOBJ-AIR	(C-F11)	Transportation
RESULTING IN:	F-TU-LOSSES	(D-F13)	
	F-ALLOC-ORDER	(D-F14)	
	F-NONALLOC-ORDER	(D-F15)	
	F-TU-DECISION	(D-F16)	
	F-LIFT-JOB	(D-F17)	

D-F13 F-TU-LOSSES

SUMMARY: This function finds the number of TU cargo vehicles lost and the amount of the supply order lost (i.e., cargo-carrying capacity) and it triggers A-LOSE-ORDER (D-A12) to revise the SUPPLY-CUSTOMER due-in and change the authorized TU vehicles to the current vehicles on-hand. If appropriate, it also creates a new order to replace the part of the order lost.

TRIGGERED BY:	F-ARRIVE-SUPPLIER	(D-F12)
	F-ARRIVE-CUSTOMER	(D-F17)
RESULTING IN:	SUPPLY-CUSTOMER	(D-E1)
	A-LOSE-ORDER	(D-A12)
	F-CREATE-TASK	(C-F1)
	F-RQ-RIMT	(D-F1[illegible])

DF-14 F-ALLOC-ORDER

SUMMARY: This function simulates a SUPPLIER (D-E2) receiving a pickup order of an ALLOCATION (D-E3) from an arriving transport unit (TU) for a supported SUPPLY-CUSTOMER (i.e., D-E1, a user unit, or a supply base).

TRIGGERED BY: F-ARRIVE-SUPPLIER (D-F12)

RESULTING IN: Fill and no-fill lists of committed supplies in a SUPPLY-CUSTOMER's ALLOCATED order.

D-F15 F-TU-DECISION

SUMMARY: This function triggers F-SPLIT-CK (C-F13) to request a decision from the TU commander when a part of a supply request (no fill list) cannot be filled by a supply base. The fill list returned is either filled or zeroed out; the no-fill list is either put on the backorder queue (BOQ) or zeroed out. The function then performs the necessary action to each list.

TRIGGERED BY:	F-ARRIVE-SUPPLIER	(D-F12)	
RESULTING IN:	F-SPLIT-CK	(C-F13)	Transportation

D-F16 F-LIFT-JOB

SUMMARY: This function simulates a supply base being tasked to perform a lift (load or unload) job. It tries to determine the best way to get it done considering the other jobs it may be tasked to do and the limited work assets it has for doing them.

TRIGGERED BY:	F-ARRIVE-SUPPLIER	(D-F12)	
	F-ARRIVE-CUSTOMER	(D-F17)	
RESULTING IN:	Schedule and reschedule:		
	A-BEGIN-LOAD	(C-A13)	Transportation
	A-BEGIN-UNLOAD	(C-A11)	Transportation
	A-END-LOAD	(C-A14)	Transportation
	A-END-UNLOAD	(C-A12)	Transportation

D-F17 F-ARRIVE-CUSTOMER

SUMMARY: This function simulates the arrival and [illegible] of a loaded transport unit (TU) at a SUPPLY-CUSTOMER (i.e., D-E1, a user unit, or a supply base).

TRIGGERED BY:	F-ATOBJ-GRND	(C-F10)	Transportation
	F-ATOBJ-AIR	(C-F11)	Transportation
RESULTING IN:	F-TU-LOSSES	(D-F13)	
	SUPPLIER	(D-E2)	
	ALLOCATION	(D-E3)	
	A-COMMIT-ALLOC	(D-A7)	
	F-TU-DECISION	(D-F15)	
	F-LIFT-JOB	(D-F16)	
	F-FILL-WAITING	(D-F18)	
	F-SUPPLY-STORE	(D-F19)	

D-F18 F-FILL-WAITING

SUMMARY: This function simulates the servicing of supply orders waiting for supplies to arrive at a supporting supply base.

TRIGGERED BY:	F-ARRIVE-CUSTOMER	(D-F17)
	SUPPLIER	(D-E2)
	A-END-UNLOAD	(D-A5)
RESULTING IN:	SUPPLIER	(D-E2)
	ALLOCATION	(D-E3)
	A-COMMIT-ALLOC	(D-A7)
	Updates a supply base SUPPLY-CUSTOMER BOQ	

D-F19 F-SUPPLY-STORE

SUMMARY: This function simulates a supply base SUPPLY-CUSTOMER receiving a loaded TU with some supplies that requires storage.

TRIGGERED BY:	F-ARRIVE-CUSTOMER	(D-F17)
RESULTING IN:	Store and no-store lists.	

APPENDIX D

Annex

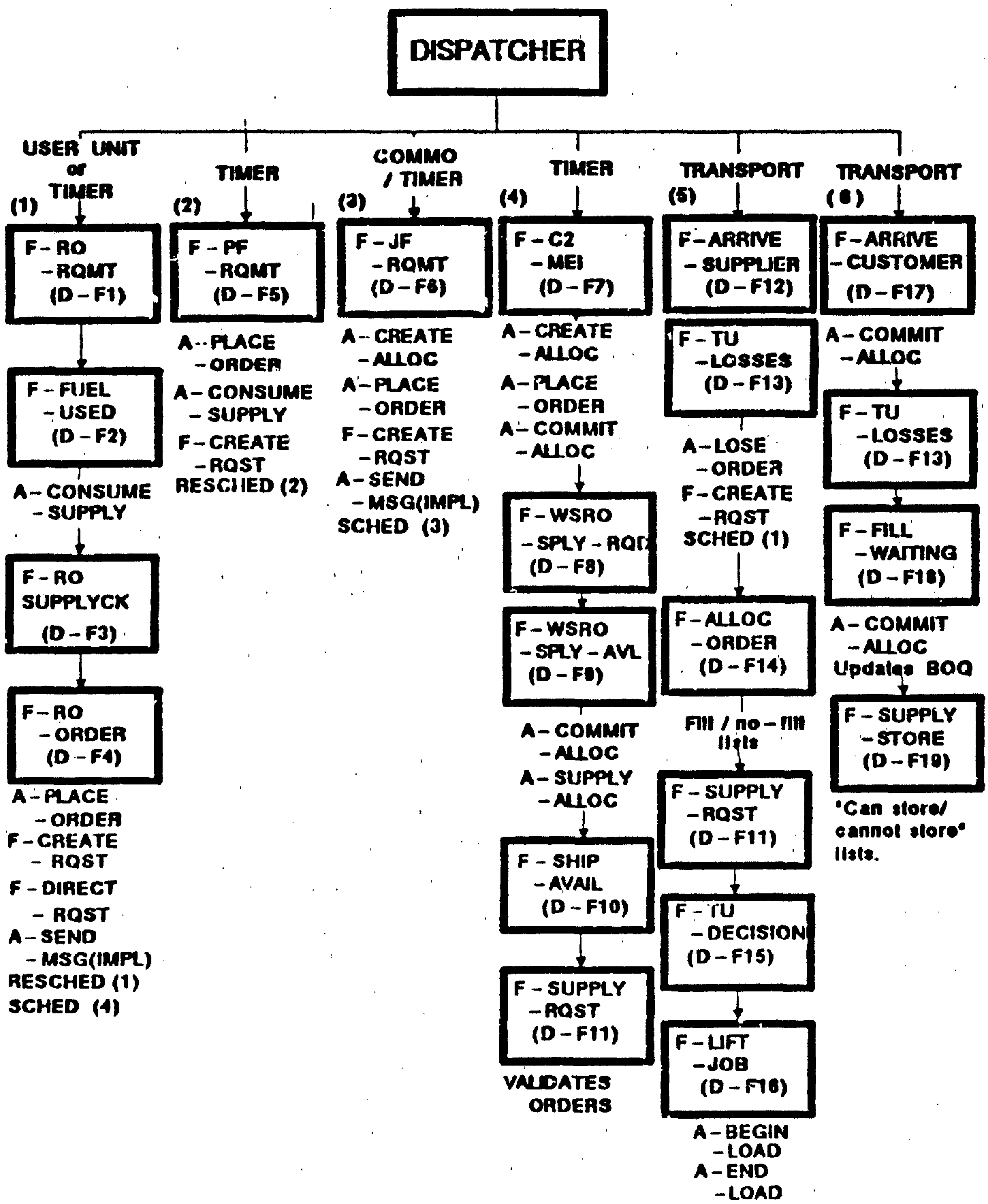

Figure D-4. Supply Dispatcher

D-F1

D-F1 **F-RO-RQMT** **TYPE: Interactive Function**

SUMMARY: This function cycles through unit(s) to determine the status of RO supply types. If the supply type is fuel, the fuel consumption algorithm (F-FUEL-USED, D-F2) determines the unit consumption and remove it from the unit stocks. The status of a supply type is checked by F-RO-SUPPLYCK (D-F3) which, when required, calls F-RO-ORDER (D-F4) to create and send an order. Major end item (MEI) battle loss reports are sent [illegible] to HQ for command decision on what requisitions to initiate. F-DIRECT-REQUEST (C-F2) is invoked if requirements for transportation support were developed in F-RO-ORDER.

TRIGGERED BY: (Note: All times are default values that can be reset during preprocessing or during the running of the game through controller interaction)

(1) User units:

(a) AMMO - Units in ground combat every 30 minutes. Units upon leaving combat. Artillery, air defense, air and victim units after each fire mission.

(b) FUEL - Prompted by the movement module for moving units arriving at center of hex (Every 3.5 km). Prompted by SCHEDULER for slow or nonmoving units every hour.

(c) MEI - Prompted by the maintenance module, after its maintenance assessment of unit MEI. It passes a list of any units which have suffered MEI losses.

(d) CL IX - Prompted by the maintenance module, at the end of its maintenance cycle. It passes a list of any maintenance units to check for low repair part supply status.

(Note: Besides the class IX depletion that a maintenance unit experiences from its own uses, its inventories are also reduced by its user's class IX PM requirements. The maintenance module accounts for these with planning factors. The supply module resupplies the maintenance units back to the basic load of repair parts.)

F-RQ-RQMT (cont.)

(2) Supply bases are all checked for replenishment on a scheduled basis:

(a) Brigade - every 3 hours
(b) Division - every 6 hours
(c) Corps - every 12 hours
(d) Theater - every 24 hours

RESULTING IN:	F-FUEL-USED	(D-F2)
	F-RQ-SUPPLYCK	(D-F3)
	F-DIRECT-RQST	(C-F2) Transportation

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-5.

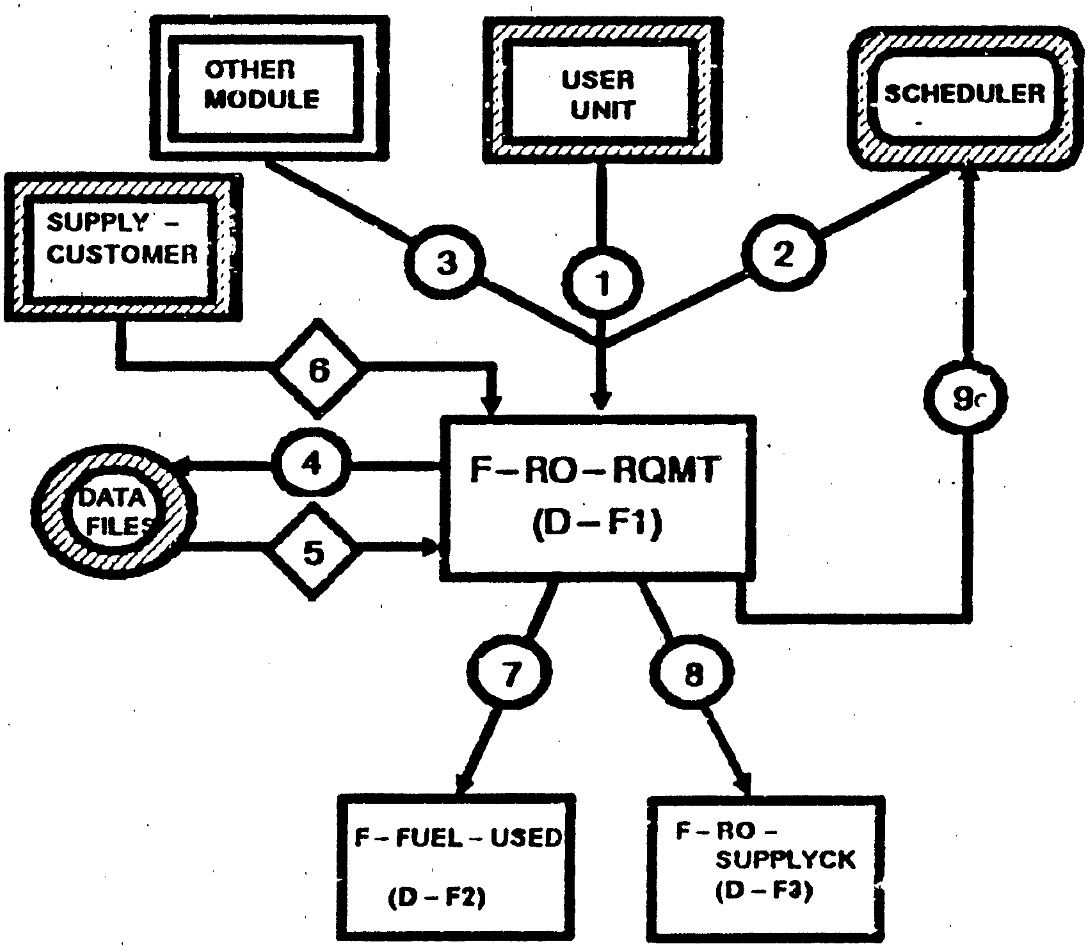

FIGURE D-5. F-RO-RQMT SSD

DATA DEFINITION: F-RO-RQMT

Connection Number	Data Transferred	Comments
D1	Parameters received from a single unit:	
	o Support flag	Set = 0 for single unit. This is the usual case, so the modules that call Supply for single unit supply checks are set to 0.
	o Unit ID	When checking a supply type of an individual unit.
	o Supply type	All items of the supply type at the unit are checked.
D2	Information from the SCHEDULER on a group of units:	
	o Support flag	Set = 1 for unit group. Supply sets this parameter for scheduled checks of a group of units.
	o Unit type o Supply type o Echelon	When checking a supply type for a group of units by type and echelon; all units supported by a SUPPLIER.
D3	Information received on a list of units to check:	
	o Support flag	Set = 2 for a list of units. The maintenance and any other modules providing a list of units to be checked set the flag to 2.
	o Unit list	Unit IDs.
	o Supply type	All items of the supply type at the unit are checked.

DATA DEFINITION: F-RO-RQMT (cont.)

Connection Number	Data Transferred	Comments
D4a	Needed to get unit list from data file (D-DF1):	
	o Side o RO supply type o Unit type (SRC) o Current time	
D4b	Needed to get next time from data file (D-DF2):	
	o Side o RO supply type o Unit type (SRC) o Echelon	
S5a	Data file (D-DF1) of unit list checked on scheduled basis:	
	o Unit list	List of unit ID's to be checked by supply type, side, unit type, echelon(s) & time.
S5b	Scheduling time data (D-DF2) for checking groups of units:	
	o Schedule time	Scheduling periodic supply checks for side, unit type, supply type, echelon and time.
S6	Info needed from the SUPPLY-CUSTOMER's state vector:	
	o Side o Dead flag o Deployment flag o Phantom unit flag	
D7	Parameters passed to F-FUEL-USED (D-F2):	
	o Unit ID	Calculate fuel consumption.

D-F1

DATA DEFINITION: F-RO-RQMT (cont.)

Connection Number	Data Transferred	Comments
D8	Parameters passed to F-RO-SUPPLYCK (D-F3):	
	o Unit ID	Determine supply type status.
	o Supply type	
D9	Parameter passed to SCHEDULER to reschedule D2:	
	o Time	Schedules F-C2-MEI.

D-F1

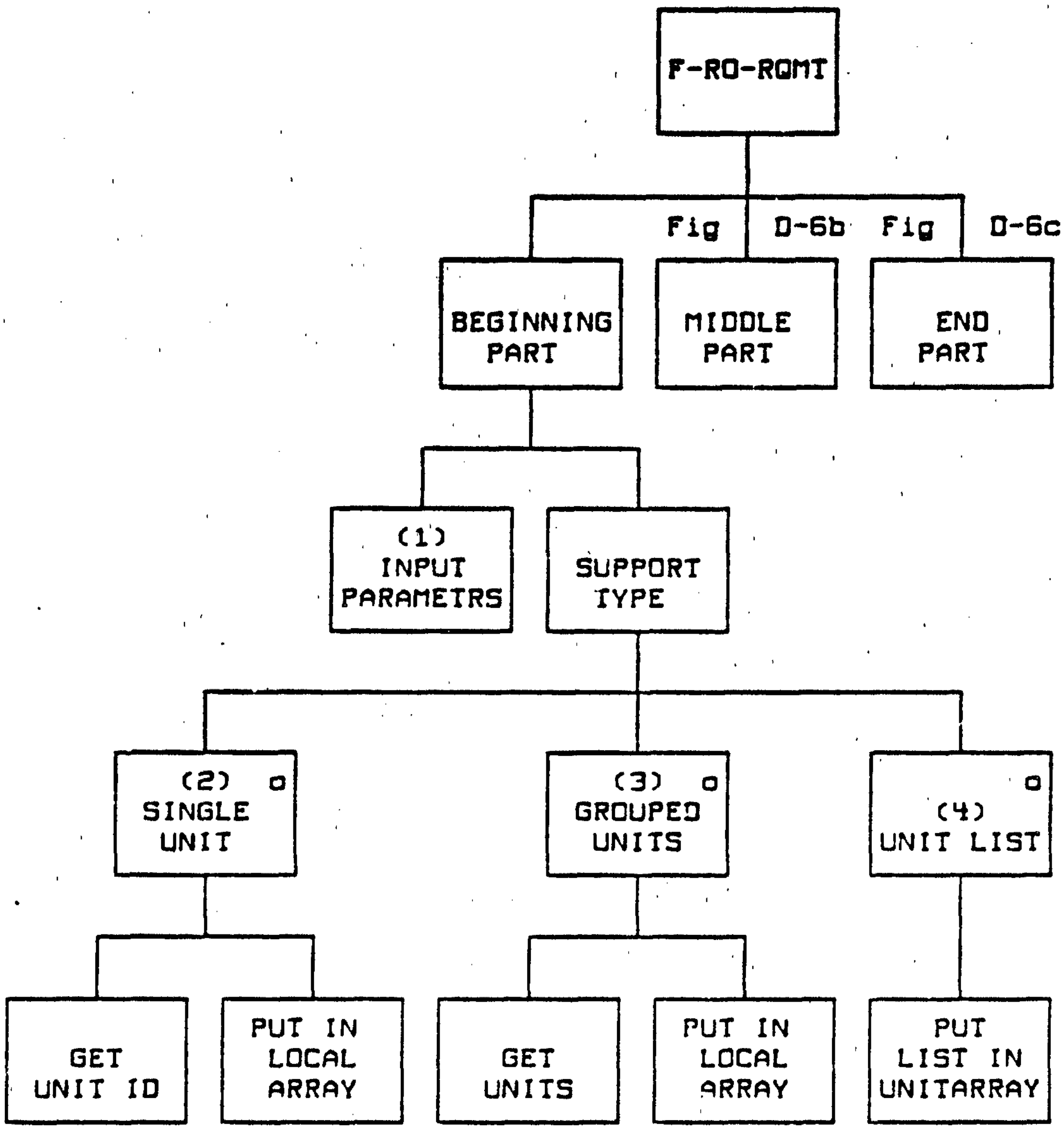

Figure D-6a. F-RO-RQMT generator

D-F1

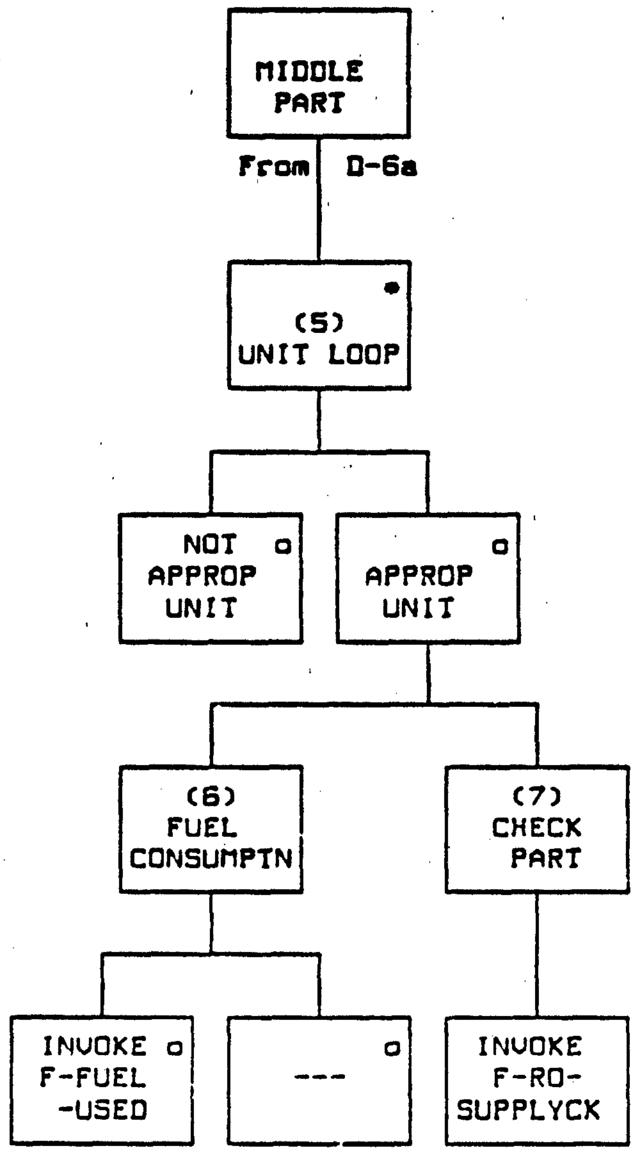

Figure D-6b. F-RO-RQMT generator (continued)

D-F1

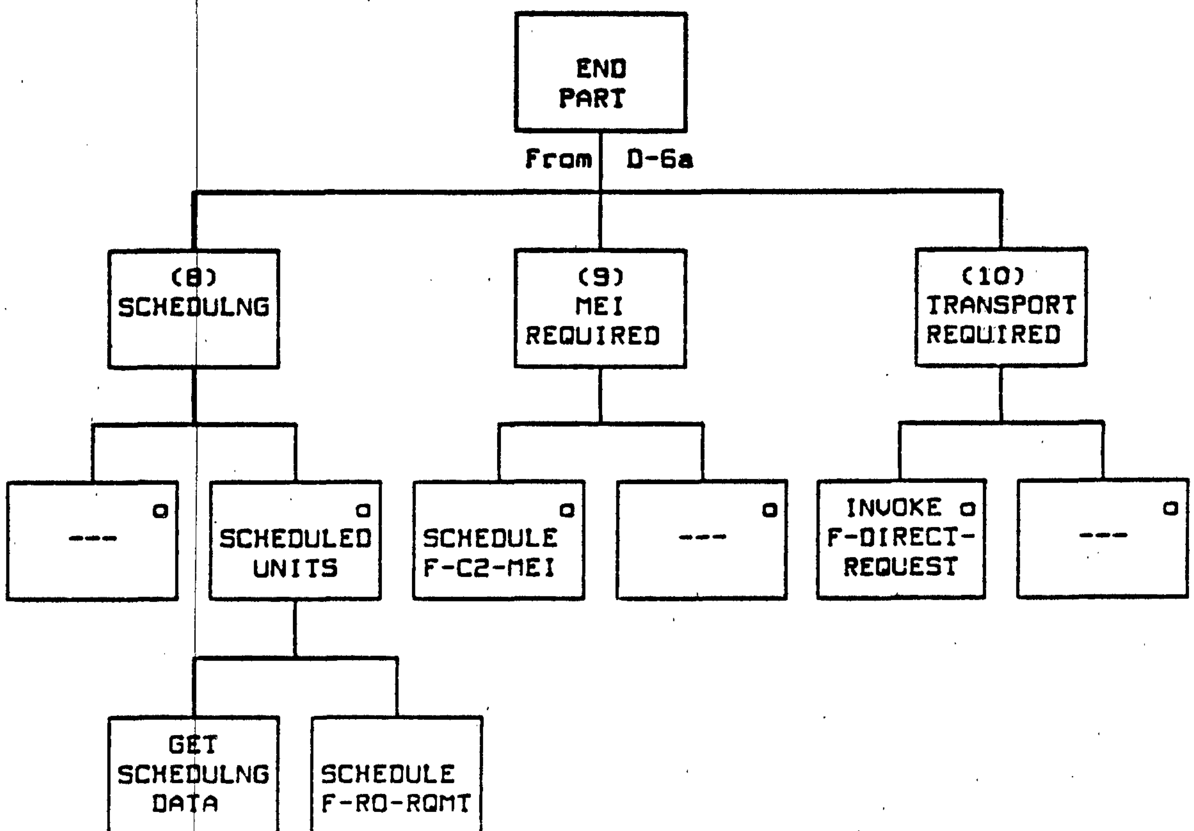

Figure D-6c. F-RO-RQMT generator (continued)

D-F1

GENERATOR DESCRIPTION: F-RO-RQMT

1. INPUT PARAMETERS. Read in the parameters passed in D1, D2 or D3.

2. SINGLE UNIT. If the support flag is set at zero (D1), the support is for a single unit. Put the unit ID into the unit array for its one trip through the unit loop at 5.

3. GROUPED UNITS. If the support flag is set at one (D2), the support is for a group of units. Read list of units to be checked from unit table for the supply type, unit type (SRC) and echelon(s) (D4a) from S5a into array(s) by echelon for the loop through the units' SRC by ascending order, i.e., ATPs, ASPs and CSAs. (Note: A utility routine must be developed for the purpose of maintaining these lists as the game is played. This will include adding newly deployed units, removing dead or nondeployed units while keeping them in the selected order (e.g., by echelon, OPCODE, etc.)

4. UNIT LIST. If the support flag is set to two (D3), the support is for a list of units, developed by another module (probably passed from the maintenance module for MEI or repair part resupply check). Put the list into unit array in preparation for paragraph 5.

5. UNIT LOOP. Cycle through the units defined and placed in array(s) in paragraphs 2, 3 or 4. Check for any inappropriate units, such as nondeployed, dead, or phantom units (S6). (Note: For the scheduled check of unit groups, these units should already be removed by the utility routine. Also, if these checks were made by the calling routine, they are not necessary here.)

6. FUEL CONSUMPTION. If the supply type is fuel, then trigger F-FUEL-USED (D7: D-F2) to determine amount consumed since last fuel assessment and remove it from the consuming unit's fuel assets.

7. CHECK/ORDER. Trigger F-RO-SUPPLYCK (D8: D-F3) to check the unit's supply type status. If an order needs to be placed, F-RO-ORDER (D-F4) is called from within F-RO-SUPPLYCK (D8: D-F3).

8. SCHEDULING. If this is a scheduled supply check for a group of units (support flag = 1), access S5b using the D4b parameters to get the time to schedule the next occurrence (D9).

9. MEI REQUIRED. If the supply type is MEI, the shortages are put on the unit's battle loss report and forwarded up command channels by F-RO-ORDER (D-F4) where, depending on the tactical/strategic situation, the MEI's scarcity and the unit's priority, the losses are requisitioned for issue.

F-RO-RQMT (cont.)

(Note: The function, F-C2-MEI (D-F7), is scheduled from F-RO-ORDER to decide on each unit MEI requirement. This is scheduled for some time (default 1 hour) in the future to ensure that the last MEI loss report (COMMO message) has arrived.)

10. TRANSPORT REQUIRED. If, during the loop through the units, orders were created and transportation requested and approved, invoke F-DIRECT-RQST (C-F2).

D-F2 F-FUEL-USED TYPE: Interactive Function

SUMMARY: This function determines the amount of fuel by type that a unit consumed since the last fuel assessment and takes the amount consumed out of the unit's fuel assets. This is based on the unit's current operation and the type and number of fuel burning systems on-hand, including an estimated amount for any nongamed equipment in the SRC.

TRIGGERED BY: F-RQ-RQMT (D-F1)

RESULTING IN: SUPPLY-CUSTOMER (D-E1)
A-CONSUME-SUPPLY (D-A10)

SYSTEMS SPECIFICATION DIAGRAM (SSD):

See figure D-7.

D-F2

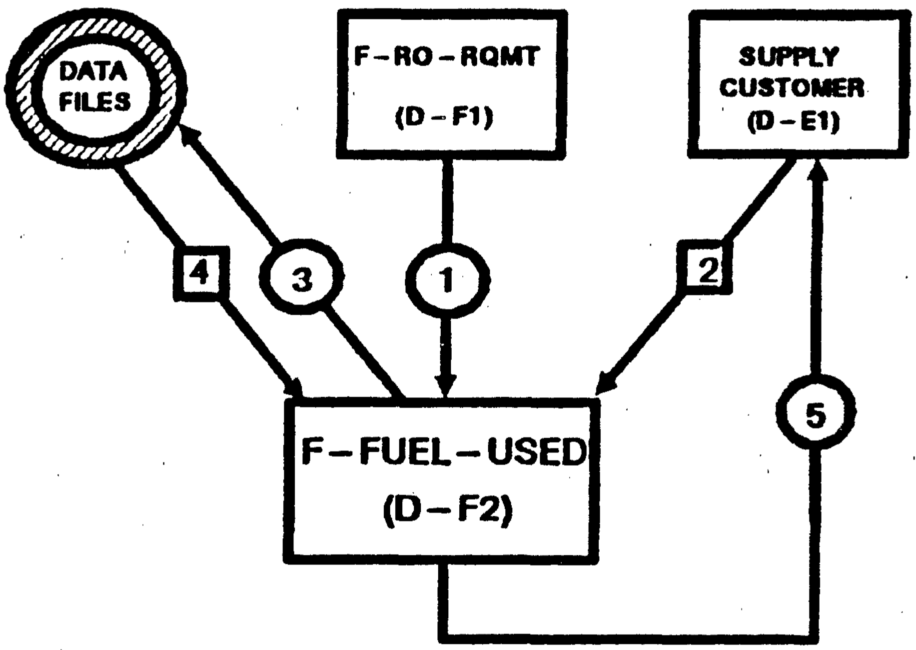

FIGURE D-7. F-FUEL-USED SSD

D-F2

DATA DEFINITION: F-FUEL-USED

Connection Number	Data Transferred	Comments
D1	Parameters passed from F-RO-RQMT (D-F1):	
	o Unit ID	Determine this unit's fuel consumption since the last assessment.
S2	Information needed from SUPPLY-CUSTOMER state vector:	
	o Previous time	Time of unit's last fuel assessment.
	o SRC	Unit type.
	o Side	
	o OPCODE	Current operation.
	o Systems on-hand	Fuel burners.
	o Fuel ID	Of each fuel type needed by the unit.
	o Fuel on-hand	Quantity available.
	o System effectiveness	Fraction of unit's systems operational.
D3	Parameters needed to get info from data file at S4:	
	o Side	
	o Unit's SRC	
	o System type	
	o Unit's OPCODE	
S4	From system-fuel related data file ([illegible]):	
	o Fuel consumption	Rate/gamed system /OPCODE/SRC.
	o " "	Rate/total nongamed systems/OPCODE/SRC.
D5	Parameters passed for A-CONSUME-SUPPLY (D-A13) action:	
	o SUPPLY-CUSTOMER ID	Unit having fuel consumed.
	o Amount consumed	(Item#, Quantity)*.
	o Current time	Time of previous fuel assessment.

D-F2

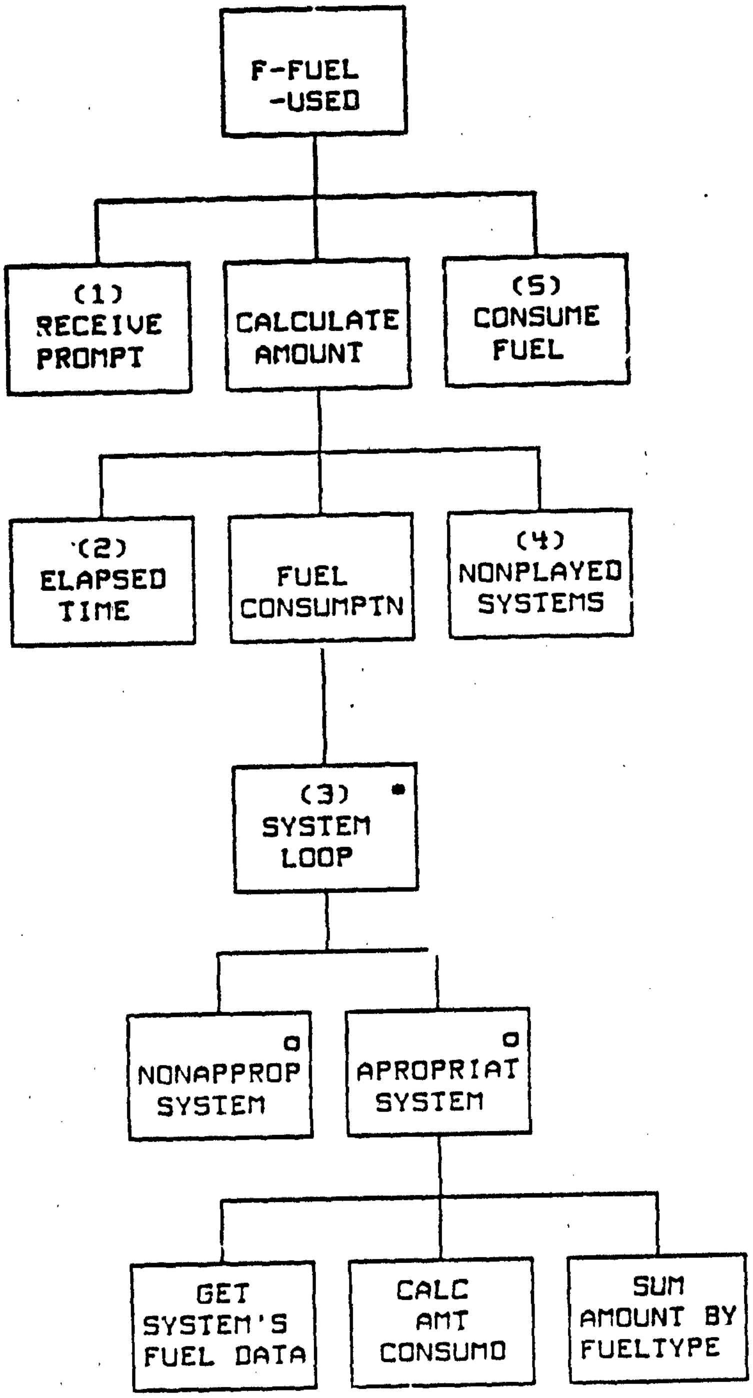

Figure D-8. F-FUEL-USED generator

GENERATOR DESCRIPTION: F-FUEL-USED

1. RECEIVE PROMPT. Read input data at D1. Get the state vector data at S2.

2. ELAPSED TIME. Determine the time elapsed by subtracting the time of the previous fuel assessment (S2) for the unit from the current time. Save the current time for the unit's next "previous fuel assessment" (D5).

3. SYSTEMS LOOP. Cycle through all of the systems in the unit skipping non-fuelburning systems. Read the number of systems available (S2) and the type of fuel each burns (D4). Read the consumption rate of the system type (S4) for the unit type and the unit's operation (OPCODE). Multiply the number of systems on-hand times the consumption rate times the elapsed time. Accumulate the amount of each fuel type consumed into an array by fuel type.

4. NONPLAYED SYSTEMS (NPS). Account for nonplayed fuel-burning systems by reading the consumption rate for all NPS for the SRC from S4, multiplying it by the elapsed time and by unit systems effectiveness, and then adding it to the appropriate fuel type.

5. CONSUME FUEL. The fuel consumption algorithm produces an array for the amount of each fuel type consumed. Trigger the A-CONSUME-SUPPLY (D-A13) action at the SUPPLY-CUSTOMER entity to subtract the amounts consumed of each fuel type from the amount available at the unit (D5). Return to F-RO-ROMT (D-F1).

D-F3 F-RO-SUPPLYCK TYPE: Interactive Function

SUMMARY: This function checks the status of an RO supply type for a unit to determine if a supply request should be sent. Before the unit's status is checked, amounts that have arrived via throughput and air lines of communication (ALOC) are determined and added into the unit's on-hand amounts. (Note: For the time being, throughput should include delivery by pipelines and barges as well as transport trucks.) The quantities on-hand and in-transit (due-in) for each item of the supply type are checked against resupply thresholds to decide what action should be taken. MEI are treated differently. The difference in an MEI's basic load and the total assigned and in-transit quantities are calculated and the difference is placed on the unit's battle loss report to be sent to command for a requisition decision.

TRIGGERED BY: F-RO-RQMT (D-F1)

RESULTING IN: F-RO-ORDER (D-F4)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-9.

D–F3

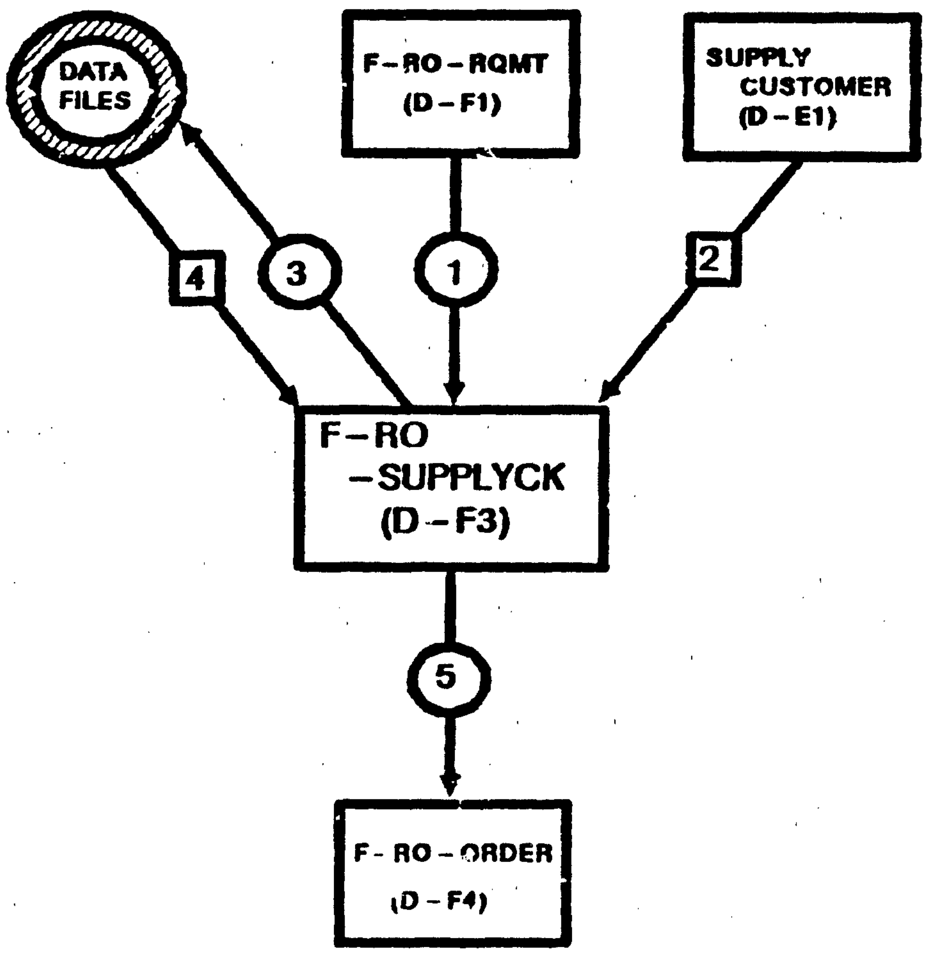

FIGURE D–9. F–RO–SUPPLYCK SSD

D-F3

DATA DEFINITION: F-RO-SUPPLYCK

Connection Number	Data Transferred	Comments
D1	**Parameters sent from F-RO-RQMT (D-F1):**	
	o Unit ID	Unit being checked.
	o Supply type	RO supply catagory being checked at the unit.
S2	**Information required from the unit's state vector:**	
	o System effectiveness	Used to calculate the RO level.
	o Unit OPCODE	Current operation.
	o Unit MSNCODE	Planned future operation.
	o ALOC flag	Flags ALOC receiving SRC for the supply type.
	o Throughput flag	Flags throughput receiving SRC for the supply type.
	o Assigned amount	Data for MEI only.
	o Authorized amount	Data for supply type per item:
	o On-hand amount	
	o Due-in amount	
	o Primary SUPPLIER ID	
	o Secondary SUPPLIER ID	
	o Alt 1 SUPPLIER ID	
	o Alt 2 SUPPLIER ID	
	o Alt 3 SUPPLIER ID	
	o Emergency SUPPLIER ID	
D3a	Needed to get info from data file at S4a:	
	o Side	
	o Unit type	
	o Supply type	
	o OPCODE	
	o MSNCODE	
D3b	Needed to get info from data file at S4b:	
	o Side	
	o Unit type	
	o echelon	
	o Supply type	

DATA DEFINITION: F-RO-SUPPLYCK (cont.)

Connection Number	Data Transferred	Comments
D3c	Needed to get info from data file at S4c:	
	o Side	
	o Supply type	
	o SRC	
	o supply item	
	o Time	
D3d	Needed to get info from data file at S4d:	
	o Side	
	o SRC	
	o Supply type	
	o Supply item	
	o MSNCODE	
S4a	Resupply threshold data file (D-DF4):	
	o Reorder point	Resupply thresholds/ unit type/supply type/ OPCODE/MSNCODE.
	o Critical point	Ditto.
	o Nonoperational point	Ditto.
S4b	RO supply type characteristic data file (D-DF5):	
	o Fraction throughput	Supply type/unit type/ echelon.
	o Fraction ALOC arriving	Ditto.
	o RO flag	Indicates if RO calculation is needed for SRC.
S4c	Supply item attribute data file (D-DF6):	
	o Total arriving (-ALOC)	Qty/supply type/SRC supply item/today.
	o Total ALOC arriving	Qty ALOC/supply type/SRC supply item today.
	o Exception flag	Flags if item not checked.

DATA DEFINITION: F-RO-SUPPLYCK (cont.)

Connection Number	Data Transferred	Comments
S4d	RO supply item forecasts (D-DF7) data file:	
	o Forecast	Daily rate/supply type/supply item/ MSNCODE/SRC.
	o Forecast NPS	Daily rate/total nonplayed supply item/supply type/ MSNCODE/SRC.
D5	Parameters sent to F-RO-ORDER (D-F4) to create order:	
	o SUPPLY-CUSTOMER ID	
	o SUPPLIER ID	Supplier for supply list.
	o Order list	(Supply type, item#, quantity)*.
	o Order type	Regular, emergency, or ALLOCATION.
	o Total available	Used to calculate
	o Total RO	noneffective fraction.

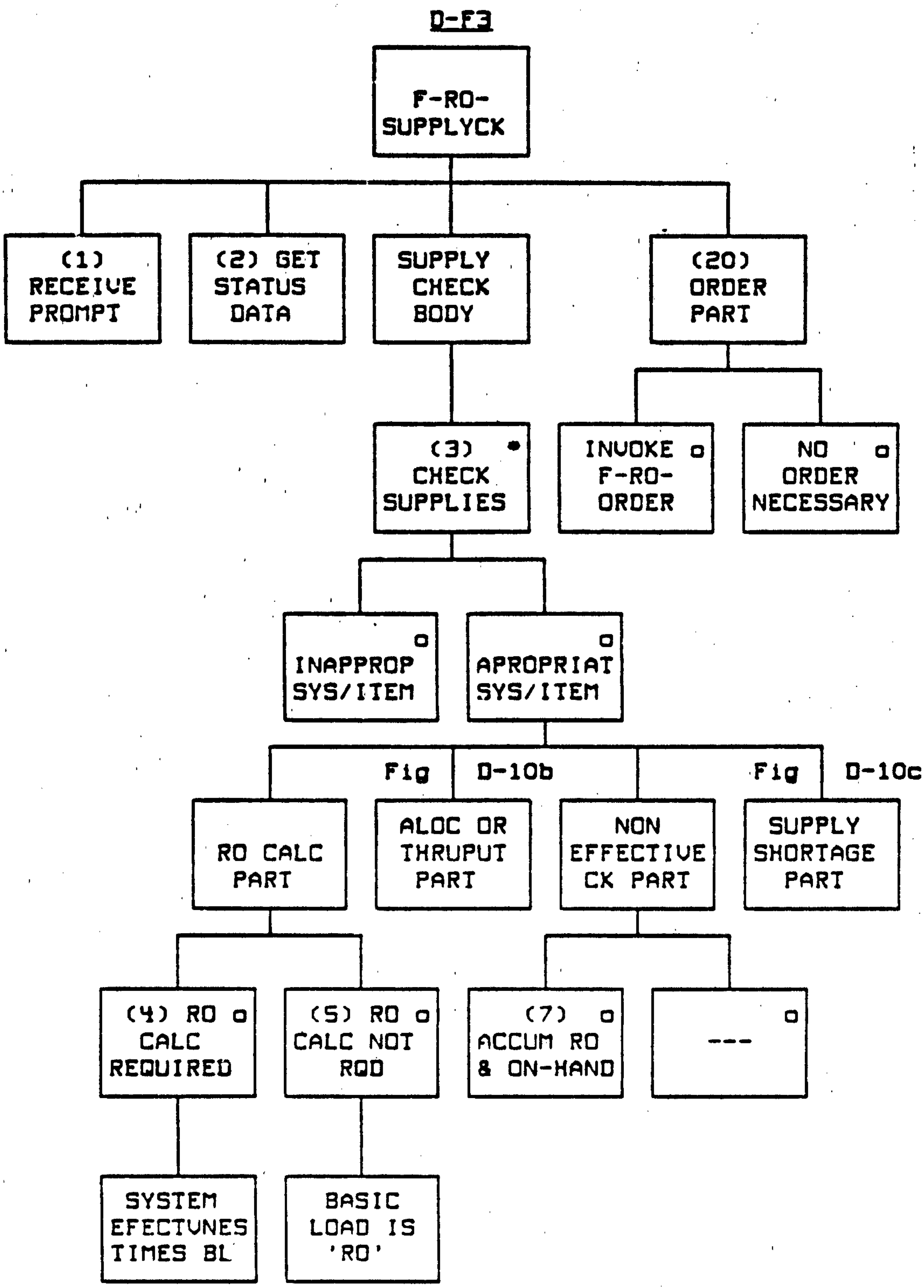

Figure D-10a. F-RO-SUPPLYCK generator.

D-F3

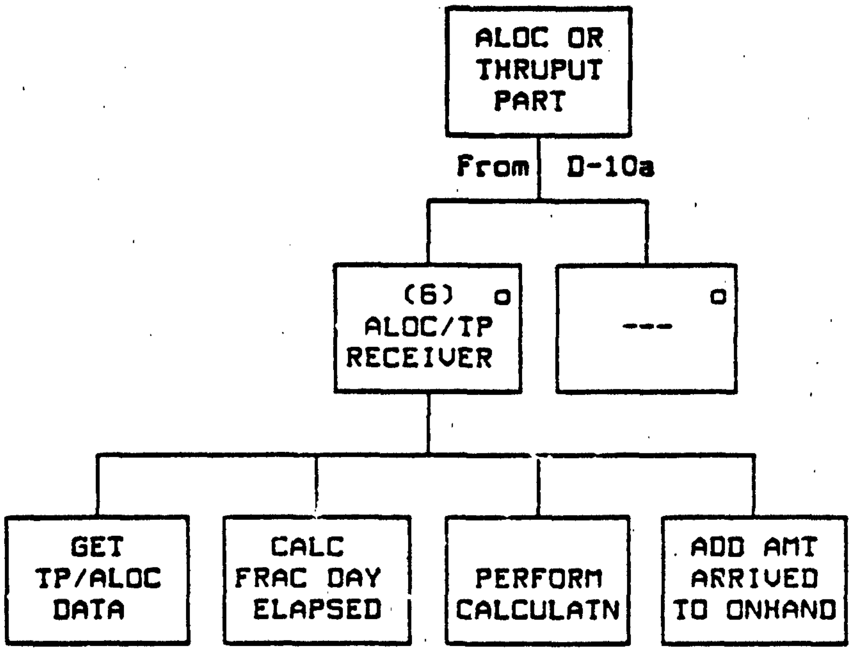

Figure D-10b. F-RO-SUPPLYCK generator (continued)

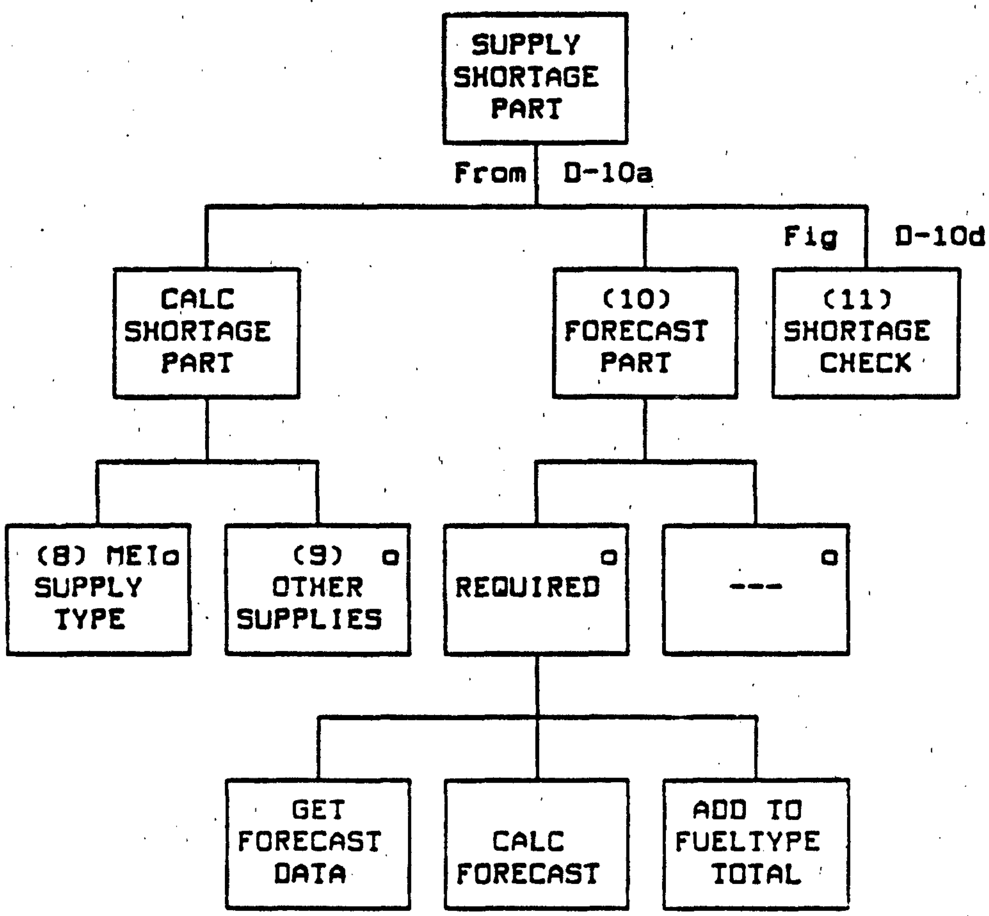

Figure D-10c. F-RO-SUPPLYCK generator (continued)

D-F3

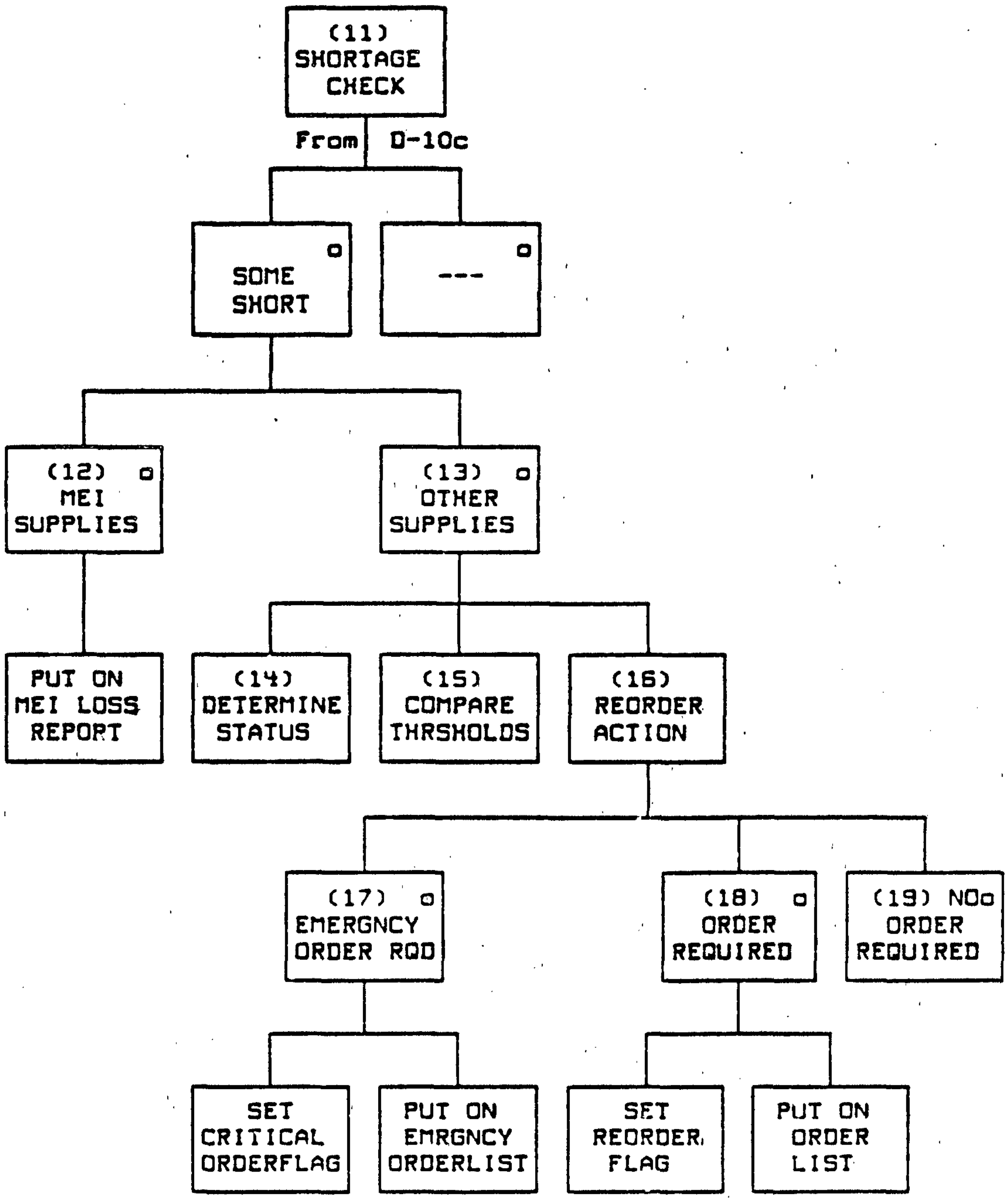

Figure D-10d. F-RO-SUPPLYCK generator (continued)

GENERATOR DESCRIPTION: F-RO-SUPPLYCK

1. RECEIVE PROMPT. Read D1 to determine which supply type is being checked for which unit.

2. GET STATUS DATA. Access the units supply data for the supply type which includes the basic load (authorized level), quantity on-hand and quantity due-in for each item of the supply type (S2). If MEI, it would also include the quantity of each MEI assigned. Read the resupply thresholds for the unit type, its OPCODE, MSNCODE and the supply type (S4a). Read the RO flag that indicates if this supply type requires the RO calculation (S4b). If RO flag set, read the unit's system effectiveness (S2) for use in the RO calculations done in the loop through the items/systems at paragraph 3.

3. CHECK SUPPLIES. Loop through all items/systems for this supply type. Read the system exception flag (S4c) that indicates if the item is handled interactively by the gamer or by some other method; if so, skip it (i.e., nukes, etc).

4. RO CALCULATION REQUIRED. Calculate the RO level of the supply item by multiplying its amount authorized by the unit's system effectiveness.

5. RO CALCULATION NOT REQUIRED. The unit maintains the basic load (authorized level) of the supply type, i.e., MEI by setting the RO level to the amount authorized.

6. ALOC OR THROUGHPUT. (TP). Check ALOC or TP flags of the supply item to see if ALOC or throughput are delivered for this unit type (S2). (Note: Throughput can include pipeline or barge delivery, or it may be preferable to keep ALOC, throughput, pipeline and barge delivery in seperate files.) If so, get the total of the supply type arriving in theater today (S4c) and the fraction of the total alloted to this unit SRC (S4b). Multiply the fraction that this unit type gets by the total amount arrived in the theater by the time elapsed. Do this for both ALOC and throughput. Add the quantity of ALOC and throughput arrived for each supply item to the unit's quantity on-hand for the item.

7. ACCUMULATE RO AND ON-HAND. Check for a noneffective threshold for the supply type and SRC. If one exists, keep a running total on the RO amounts and the on-hand amounts. These totals are passed later to F-RO-ORDER (if an order is created). These totals are used to see if the unit's supply status for the supply type has breached the noneffective threshold.

D-F3

F-RO-SUPPLYCK (cont.)

8. MEI SUPPLY TYPE. If MEI, determine the losses by subtracting the number assigned and due-in (noncommitted) from the basic load quantity for the unit type (S2). (Note: The assigned systems are those on-hand and in DS maintenance units. Catastrophic kills and systems taken to GS maintenance have lost their unit identities.)

9. OTHER SUPPLIES. If any other RO supply type, determine the amount short by subtracting the amounts on-hand and due-in (noncommitted) from the RO supply level for the supply type.

10. FORECAST. If a forecast amount is in S4d for the supply and unit type, get the expected additional amount of the supply type required for each of the system types during the assigned mission, multiply the quantity of the system type by the amount, aggregate it and increase the amount of the supply item short by the amount of the forecasted quantity. Get the forecast amount to be added in for nongamed systems and multiply it times the system effectiveness. Add the result to the amount short.

11. SHORTAGE CHECK. If a shortage of the supply item exists, determine if the supply type is MEI or another supply type.

12. MEI SUPPLIES. If the supply type short is MEI (S4b), the supply level is not checked against a reorder threshold. Instead, the amount of the MEI short is added to the MEI battle loss report list which is sent up the command channels via COMMO where decisions are made regarding what actions, if any, are to be taken toward replacing the lost systems. The requesting unit's due-in balance for the depleted MEI is not increased until a requisition for issue is made to the MEI supplier and an ALLOCATION is created.

13. OTHER SUPPLIES. Status of the other supply types are compared against the supply reorder thresholds (S4a).

14. DETERMINE STATUS. Determine the unit's supply status for non-MEI by dividing the amount on-hand plus due-in (noncommitted) by the item's RO level. This calculation provides the fraction that is compared below.

D-F3

F-RO-SUPPLYCK (cont.)

15. COMPARE THRESHOLDS. Compare the resulting status fraction to the reorder or critical thresholds. If a noneffective threshold datum exists for the unit and an order is to be created, a total status fraction is used later in F-RO-ORDER (D5: D-F4) to determine if the unit is noneffective as a result of the shortage of the supply type. (See 7)

16. REORDER ACTIONS. If the fraction of RO is below the reorder or critical points, then set the appropriate reorder flag and read (S2) the item's normal, alternate, or emergency supplier (S2). A list of items short is developed for each supplier.

17. EMERGENCY ORDER REQUIRED. If below the critical level, add the supply type, item and amount short to the emergency list for the emergency supplier. Turn on the order flag.

18. REGULAR ORDER REQUIRED. If below the reorder level add the supply type, item/system, and quantity to the regular order per supplier. Turn on the order flag.

19. NO ORDER REQUIRED. If the status fraction is not at or below the reorder level, do not put the item on an order list. Do not alter the order flag. The exception was discussed in 12.

20. ORDER PART. If the order flag was not turned on during the loop through the items of the supply type, then exit. Otherwise, invoke F-RO-ORDER (D5).

D-F4 F-RO-ORDER TYPE: Interactive Function

SUMMARY: This function first checks if a unit is noneffective based on the status of a given supply type. If not effective, it sends a COMMO message to the CSS gamer to notify him of the unit's situation so an appropriate action can be taken. MEI loss reports are sent to headquarters via COMMO for a requisition decision. Other supply orders are submitted for transportation support for the requesting unit. Transportation may refuse to provide support at this time if the order is too small.

TRIGGERED BY: F-RO-SUPPLYCK (D-F3)

RESULTING IN: SUPPLY-CUSTOMER (D-E1)
A-PLACE-ORDER (D-A1)
F-CREATE-RQST (C-F1) Transportation
(COMMO module implied action: A-SEND-MESSAGE)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-11.

D–F4

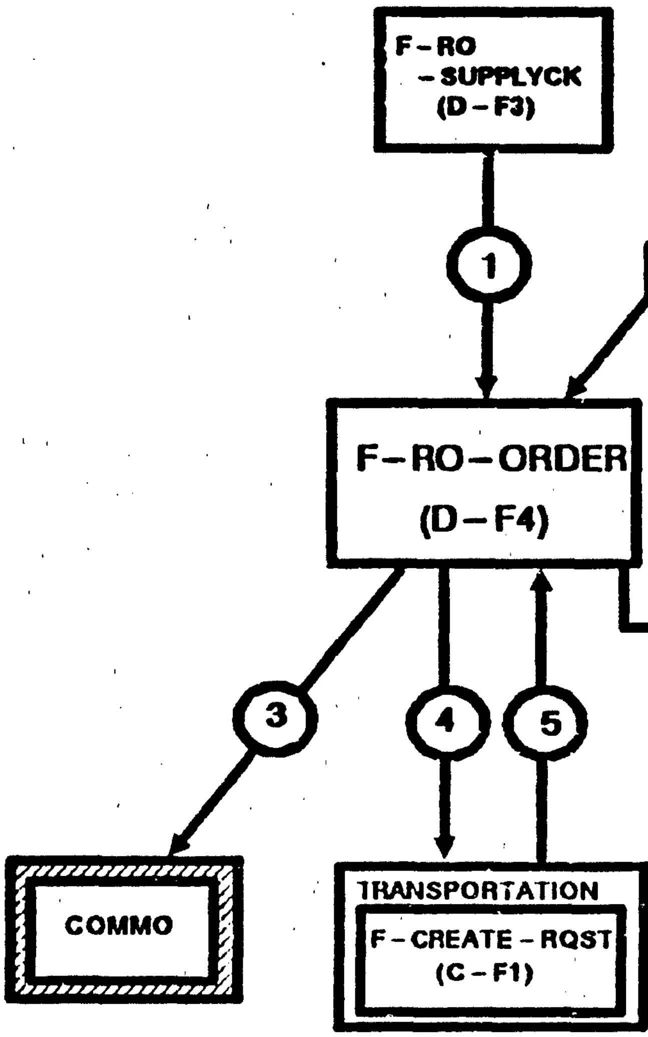

FIGURE D-11. F-RO-ORDER SSD

DATA DEFINITION: F-RO-ORDER

Connection Number	Data Transaction	Comments
D1	Parameters received from F-RO-SUPPLYCK (D-F3):	
	o SUPPLY-CUSTOMER ID	
	o SUPPLIER ID	
	o Order list	(Supply type, item#, quantity)*.
	o Order type	Regular, emergency, or ALLOCATION.
	o Total available	Used to calculate
	o Total RO	noneffective fraction.
S2	Information from the SUPPLY-CUSTOMER state vector:	
	o Side	Blue or Red.
D3a	Information sent in COMMO message to gamer about SUPPLY-CUSTOMER:	
	o Unit ID	
	o Supply type	
	o Status	
D3b	Information sent in COMMO message about MEI requisition:	
	o SUPPLY-CUSTOMER ID	
	o SUPPLIER ID	
	o Battle loss list (System#, quantity)* lost.	
D4	Trigger F-CREATE-ROST (C-F1):	
	o Outset unit	For Blue, this is usually the SUPPLY-CUSTOMER unit unless for supplybase replenishment. For Red, this is nearly always the SUPPLIER unit.
	o Destination unit	For Blue, this is usually the SUPPLIER unit. For Red, this is nearly always the SUPPLY-CUSTOMER.

DATA DEFINITION: F-RO-ORDER (cont.)

Connection Number	Data Transaction	Comments
D4	Trigger F-CREATE-ROST (C-F1)	(cont.):
	o Order list	(Supply type, item#, quantity)*
	o Order type	Normal, emergency, or ALLOCATION.
D5	Receive Transportation response:	
	o Request flag	0 = no request created. 1 = request created.
D6	Trigger to A-PLACE-ORDER (D-A1):	
	o SUPPLY-CUSTOMER ID	Change SUPPLY-CUSTOMER's supply status.
	o Supply order	(Supply type, item#, quantity)* verified.

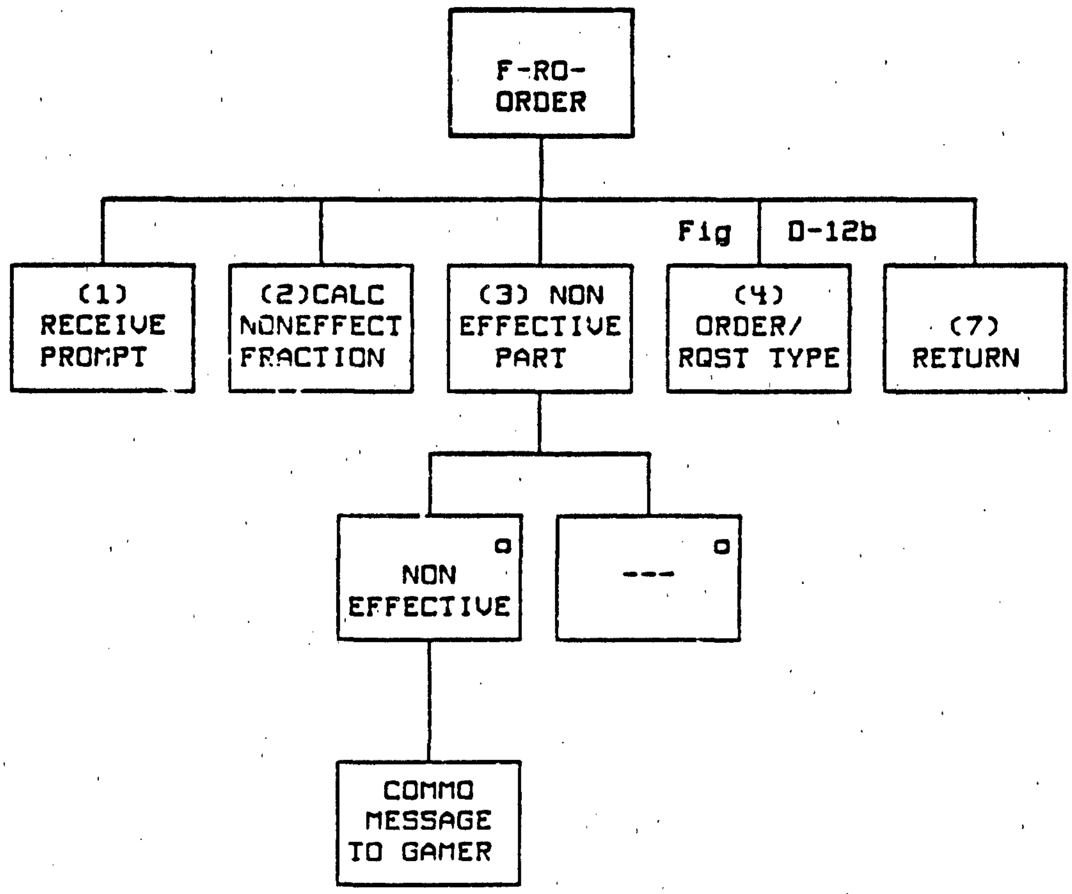

Figure D-12a. F-RO-ORDER generator

D-F4

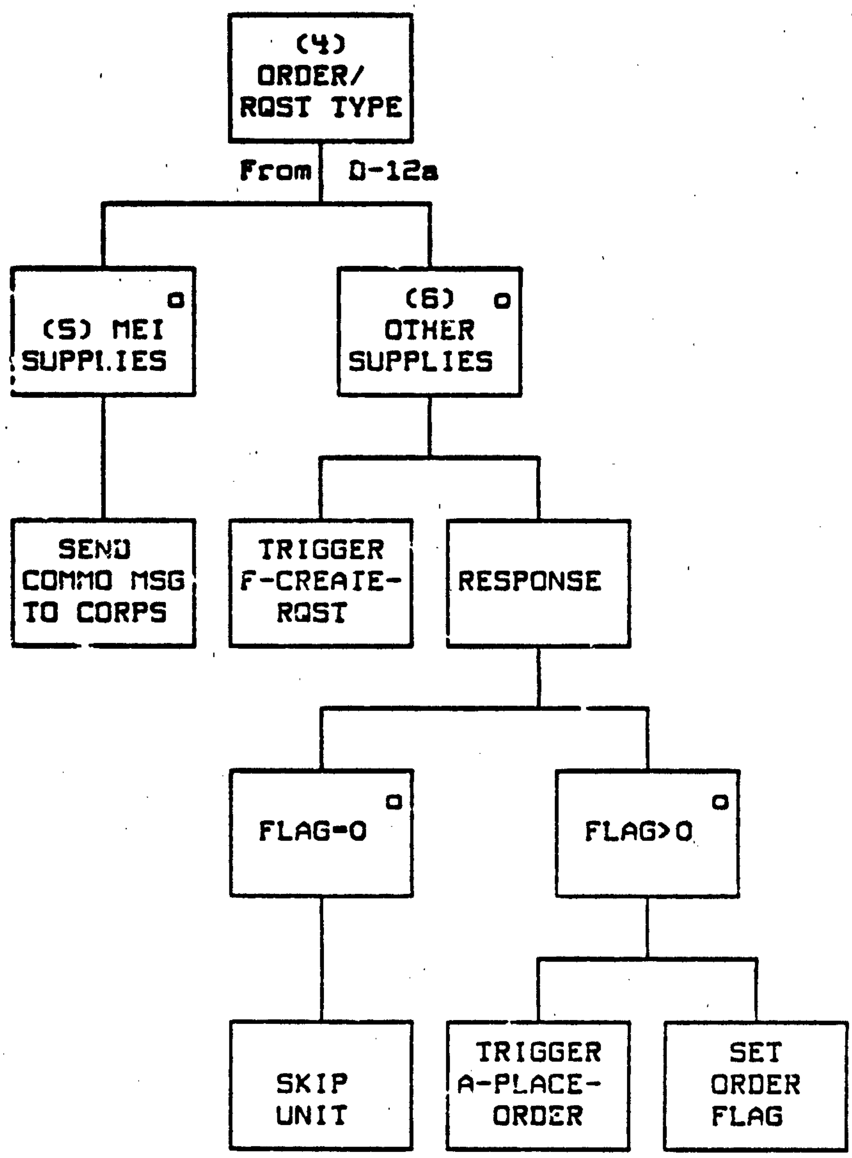

Figure D-12b. F-RO-ORDER generator (continued)

D-F4

GENERATOR DESCRIPTION: F-RO-ORDER

1. RECEIVE PROMPT. Read input parameters from D1.

2. CALCULATE NONEFFECTIVE FRACTION. Get the total RO and total on-hand accumulated during the check of the supply items. Determine if the unit's status for the supply type is in the noneffective level by dividing the total on-hand by the total RO to get the fraction to compare to the noneffective threshold.

3. NONEFFECTIVE PART. If the comparison indicates that the unit is ineffective for the supply type, send a message to the gamer (D3a) for his information and action. Place the order (the gamer can decide to delete it).

4. ORDER/REQUEST TYPE. Check the order list (D1) to determine if MEI battle loss report or supply order for a non MEI supply type.

5. MEI ORDER. If MEI, send the MEI battle losses list to corps via a COMMO message (D3b).

6. OTHER SUPPLIES. If the supply type is other than MEI, check D2 to get the unit's side so the starting point unit and ending point unit parameters can be passed to transportation approprialy for the unit's side. (Note: The Blue starting point for user unit resupply is usually at the unit, except for supply base replenishment. Red is nearly always from the supply base going to the unit, except in critical circumstance when the unit may send its organic vehicles back for supplies). Then pass the supply order to transportation by triggering F-CREATE-RQST (D4: C-F1). Receive the response from transportation at D5. If the request flag returned is zero, skip the unit. It will be checked again at a later time. If the request flag is one, invoke A-PLACE-ORDER (D6: D-A1) to update the SUPPLY-CUSTOMER unit's due-in for the amount of the items ordered.

7. RETURN. Return to the calling routine, F-RO-SUPPLYCK (D-F5). No information returned.

D-F5

D-F5 **F-PF-RQMT** TYPE: Interactive Function

SUMMARY: This function determines a unit's supply requirements for its supply types accounted for through planning factors (PF) and it requests transportation support for pickup and delivery of the supplies. It is triggered by the scheduler which activates it periodically based upon the data input. The default is 24 hours.

TRIGGERED BY: Scheduler (Default is 24 hours).

RESULTING IN:	SUPPLY-CUSTOMER	(D-E1)	
	A-PLACE-ORDER	(D-A1)	
	A-CONSUME-SUPPLY	(D-A13)	
	F-CREATE-RQST	(D-F1)	Transportation

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-13.

D-F5

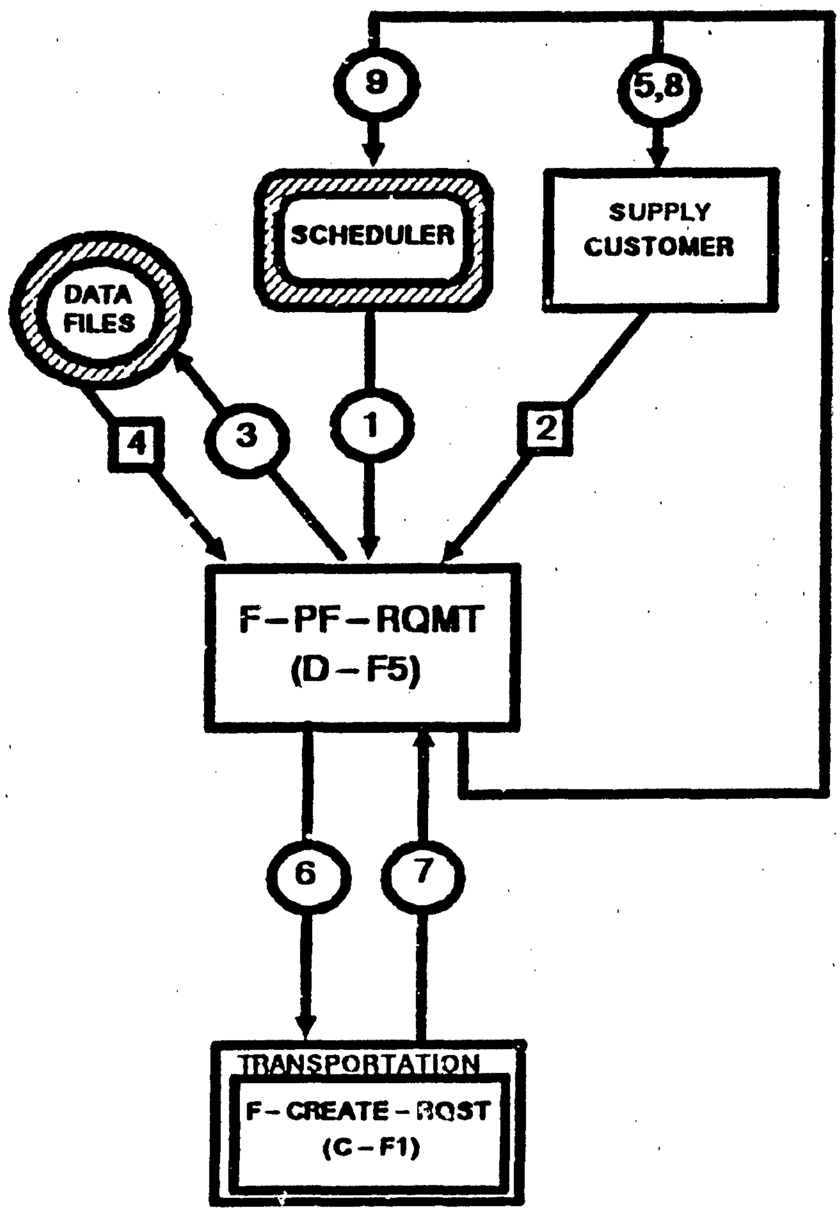

FIGURE D-13. F-PF-RQMT SSD

DATA DEFINITION: F-PF-RQMT

Connection Number	Data Transferred	Comments
D1	Information passed by the scheduler:	
	o Time	Previous time this assessment occurred.
	o Supply type(s)	Indicator of supply types to be distributed.
	o Side	Blue or Red.
S2	SUPPLY-CUSTOMER's required state vector information:	
	o Unit type	
	o Side	
	o MOPP posture	
	o Contamination level	
	o OPCODE	
	o SUPPLIER(s) ID	
	o Number of personnel	
	o Personnel effectiveness	
D3a	Parameters needed to access the data file at S4a:	
	o Supply type	
	o Unit type	
	o Side	
	o MOPP posture	
	o Contamination level	
	o OPCODE	
	o MSNCODE	
D3b	Parameters needed to access the data file at S4b:	
	o Supply type	
	o Side	
S4a	Planning factor data file (D-DF8) information:	
	o Planning factors	Weight amount/man/day.
S4b	Planning factor scheduling data file (D-DF9):	
	o Schedule time	For PF supply types.

DATA DEFINITION: F-PF-RQMT (cont.)

Connection Number	Data Transferred	Comments
D5	Parameters passed to trigger A-CONSUME-SUPPLY (D-A13):	
	o Unit ID	Consuming unit.
	o Supplies consumed	(Supply type, item#, quantity)*.
	o Current game time	Save as previous time checked.
D6	Trigger F-CREATE-RQST (C-F1):	
	o Outset unit	For Blue, usually the SUPPLY-CUSTOMER unit unless for supply base replenishment. For Red, usually the SUPPLIER.
	o Destination unit	For Blue, usually the SUPPLIER. For Red, this is nearly always the SUPPLY-CUSTOMER.
	o Order list	(Supply type, item#, quantity)*.
	o Order type	Normal, emergency or ALLOCATION.
D7	Receive Transportation response:	
	o Request flag	0 = no request created. 1 = request created.
D8	Trigger to A-PLACE-ORDER (D-A1):	
	o SUPPLY-CUSTOMER ID	Change SUPPLY-CUSTOMER's supply status.
	o Supply order	(Supply type, item#, quantity)* verified.
D9	Schedule the next occurrence of this assessment:	
	o Time	Next time this assessment occurred.
	o Supply type(s)	Indicator of supply types to be distributed.
	o Side	

D-FS

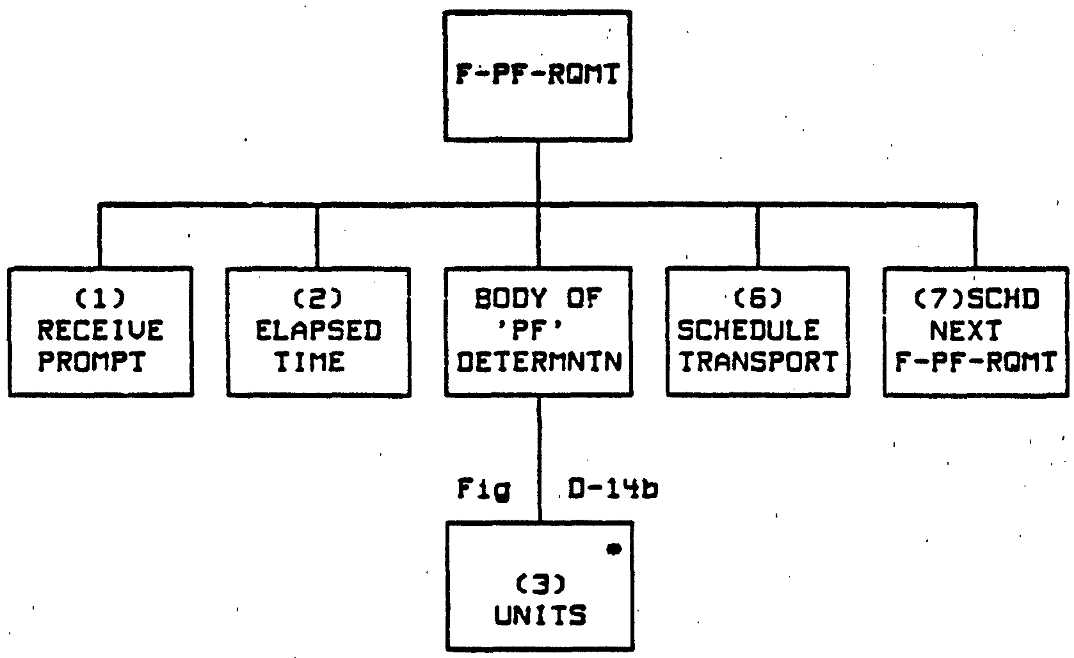

Figure D-14a. F-PF-RQMT generator

D-FS

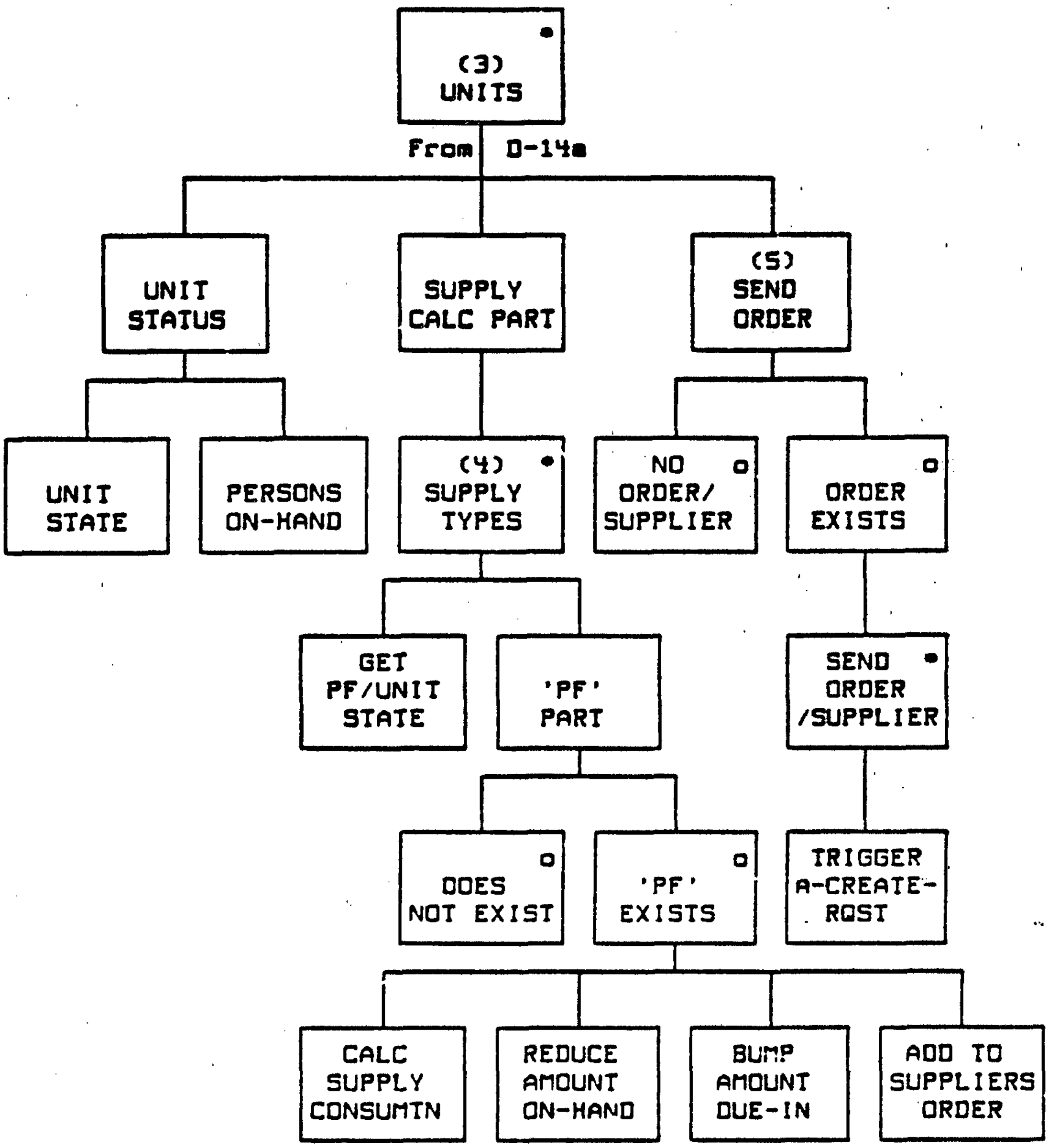

Figure D-14b. F-PF-RQMT generator (continued)

D-F5

GENERATOR DESCRIPTION: F-PF-RQMT

1. RECEIVE PROMPT. Read input parameters (D1).

2. ELAPSED TIME. Determine the time elapsed since the previous distribution of the planning factor (PF) supply type(s). Subtract time of previous assessment (D1) from the current time.

3. UNIT LOOP. Begin cycling through all units in the force. The supply types treated with the PF method are usually general to a unit. Get each unit's state vector data (S2).

4. SUPPLY TYPES. Loop through all of the PF supply types at each unit. Read in the planning factor amount for the supply type for the unit's current state (S4a). Multiply the planning factor times the number of persons available. Reduce the on-hand inventory by the amount. Determine the order amount by subtracting the on-hand and due-in quantities from the product of the authorized level times the personnel effectiveness. Add the result to the order list being prepared for submission to the supplier.

5. SEND ORDER. When all of the requirements for the unit's PF supplier(s) are accumulated, set the arguments for the transportation appropriately for the starting point and destination point. (Note: The Blue starting point for user unit resupply is usually at the unit, except for supply base replenishment. Red is nearly always from the supply base going to the unit, except in critical circumstance when the unit may send its organic vehicles back for supplies.) Then trigger A-CONSUME-SUPPLY (D5:D-A13) to reduce the amount available at the unit and send the order(s) to transportation (D6: F-CREATE-RQST (C-F1)). If the request flag returned (D7) indicates the request was created, trigger A-PLACE-ORDER (D8: D-A1) to update the unit's due-in per supply type ordered and set a local flag for paragraph 6.

6. SCHEDULE TRANPORTATION. Once the unit loop is finished, if requests were submitted and accepted by transportation, invoke F-DIRECT-RQST (C-F2) to indicate to transportation that all of the orders are ready.

7. SCHEDULE. Read the time (S4b) for scheduling the next occurrence of this PF supply type assessment. Schedule the next PF occurrence (D9).

D-F6 F-JF-RQMT TYPE: Interactive Function

SUMMARY: This function receives a message through COMMO from the gamer or requesting unit placing a special job order for supplies needed to accomplish an assigned job or is triggered by the scheduler when the special order praviously entered continues being sent on a periodic basis. It reserves the special order at the sending unit and places an order from the sending unit's supplier for those requested supplies not available or due in. It requests needed transportation support.

TRIGGERED BY: A COMMO message
Scheduler.

RESULTING IN:	SUPPLY-CUSTOMER	(D-E1)	
	SUPPLIER	(D-E2)	
	ALLOCATION	(D-E3)	
	A-CREATE-ALLOC	(D-A6)	
	SUPPLY-CUSTOMER	(D-E1)	
	A-PLACE-ORDER	(D-A1)	
	F-CREATE-RQST	(C-F1)	Transportation
	F-DIRECT-RQST	(C-F2)	Transportation
	Schedule F-JF-RQMT	(D-F6)	
	(Implied COMMO module action: A-SEND-MESSAGE)		

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-15.

D-F6

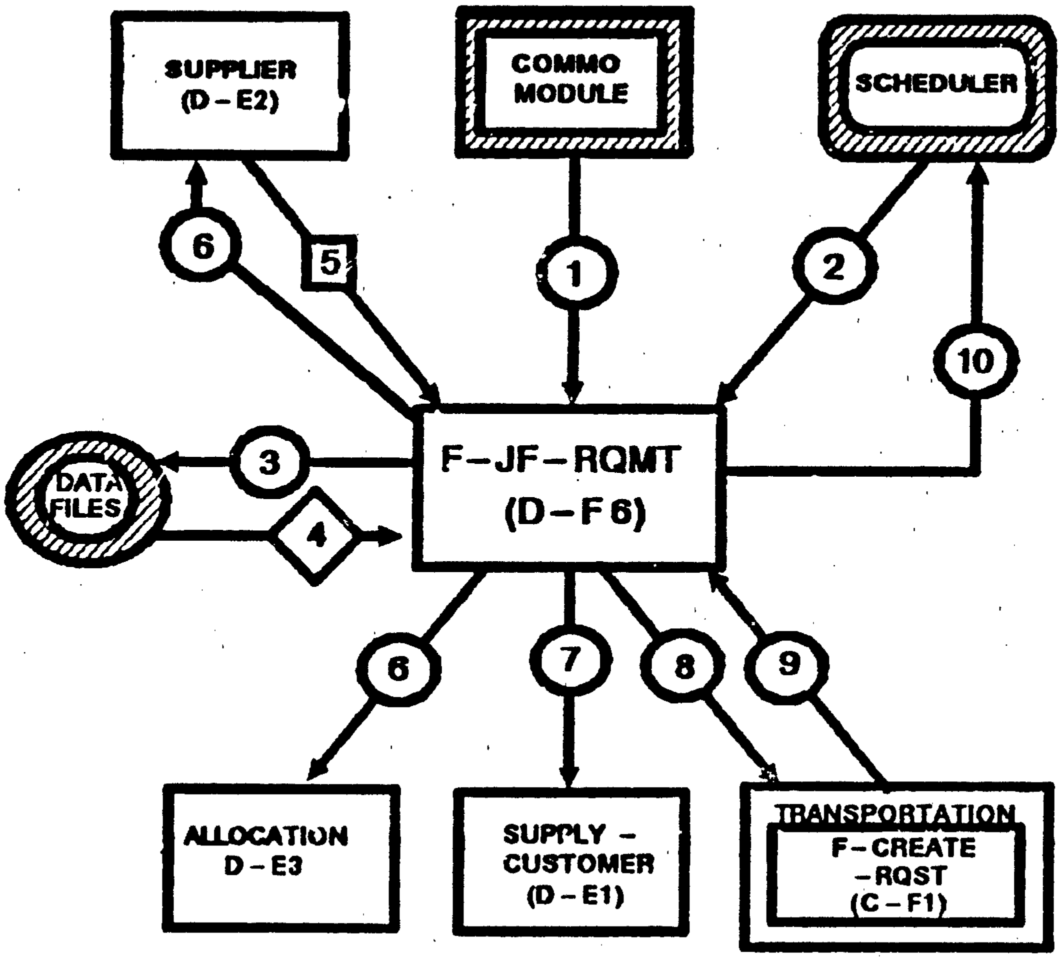

FIGURE D-15. F-JF-RQMT SSD

D-F6

DATA DEFINITION: F-JF-RQMT

Connection Number	Data Transferred	Comment
D1	Special order parameters received from gamer/user unit via COMMO:	
	o Receiving unit ID	Unit to receive supplies.
	o Sending unit ID	Unit to send supplies.
	o Order list	(Supply type, item#, quantity)*.
	o Time scheduled	Array of clock times.
	o Repetitions	Number of times order to be sent.
D2	Parameter from SCHEDULER about special order:	
	o Order ID	
D3a	Information stored about special scheduled order(s):	
	o Order ID	
	o SUPPLY-CUSTOMER ID	
	o SUPPLIER ID	
	o Order list	(Supply type, item#, quantity)*.
	o Schedule time	
	o Repetitions	Decrement each time order is sent.
D3b	Parameter passed to retrieve order from data file:	
	o Order ID	
D3c	Parameter passed to set changed data in order file:	
	o Order ID	
	o Repetitions	Remaining.

D-F6

DATA DEFINITION: F-JF-RQMT (cont.)

Connection Number	Data Transferred	Comment
S4	Information retrieved from data file about special scheduled order(s):	
	o SUPPLY-CUSTOMER ID	
	o SUPPLIER ID	
	o Order list	(Supply type, item#, quantity)*.
	o Schedule time	
	o Repetitions	Decrement each time order is sent.
S5	Status information needed from SUPPLIER (D-E2):	
	o Amount available	(Supply type, item#, quantity)*.
D6	Parameters passed to trigger A-CREATE-ALLOC (D-A6):	
	o SUPPLY-CUSTOMER ID	
	o SUPPLIER ID	
	o Special order list	(Supply type, item#, quantity)*.
D7	Parameters passed to trigger A-PLACE-ORDER (D-A[illegible]):	
	o Unit ID	
	o Order list	(Supply type, item#, quantity)*.
D8	Parameters passed to trigger F-CREATE-RQST (C-F1):	
	o Unit ID	
	o Supplier ID	
	o Order list	(Supply type, item#, quantity)*.
	o Order type	Regular, emergency, or ALLOCATION.

DATA DEFINITION: F-JF-RQMT (cont.)

Connection Number	Data Transferred	Comment
D9	Receive Transportation response:	
	o Request flag	0 = no request created. 1 = request created.
D10	Parameters sent to SCHEDULER for next occurrence:	
	o Event time	
	o Order ID	

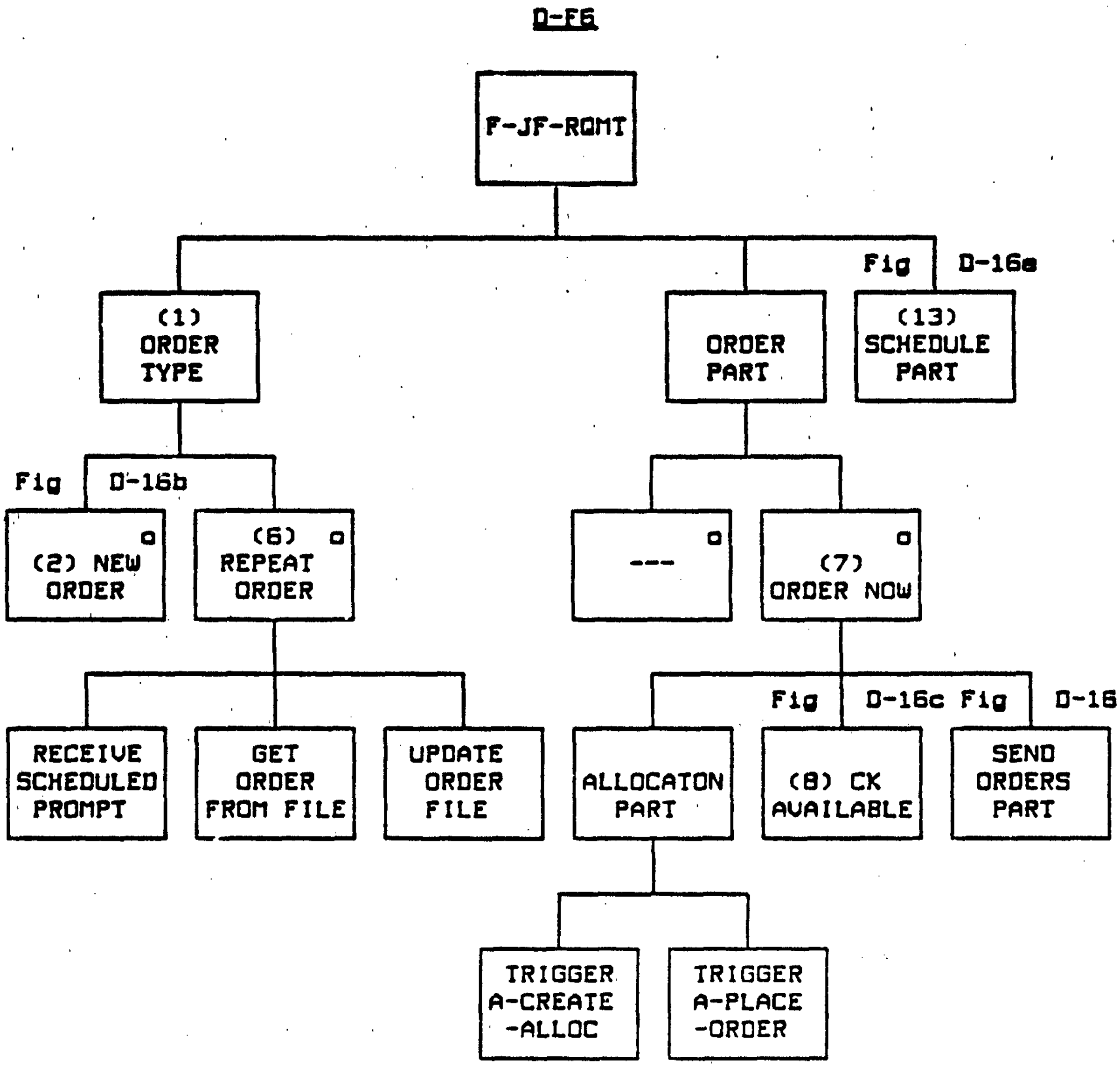

Figure D-16a. F-JF-RQMT generator

D-F6

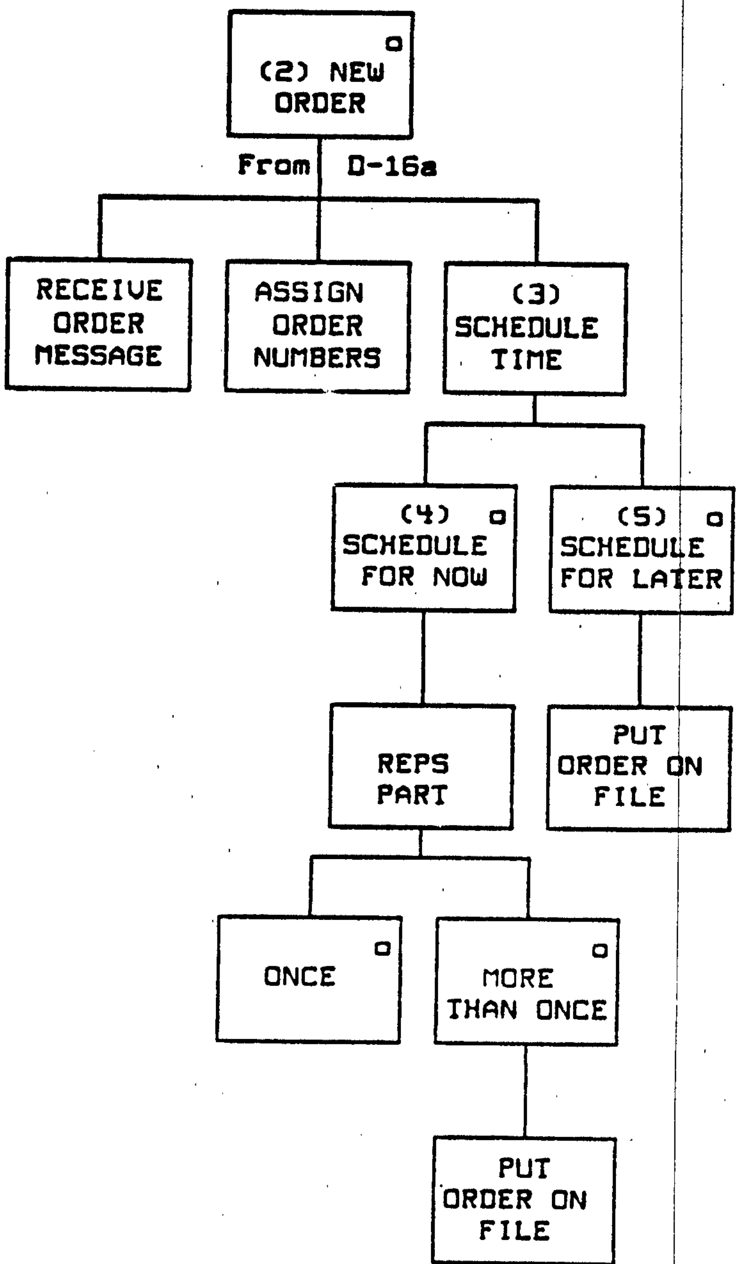

Figure D-16b. F-JF-RQMT generator (continued)

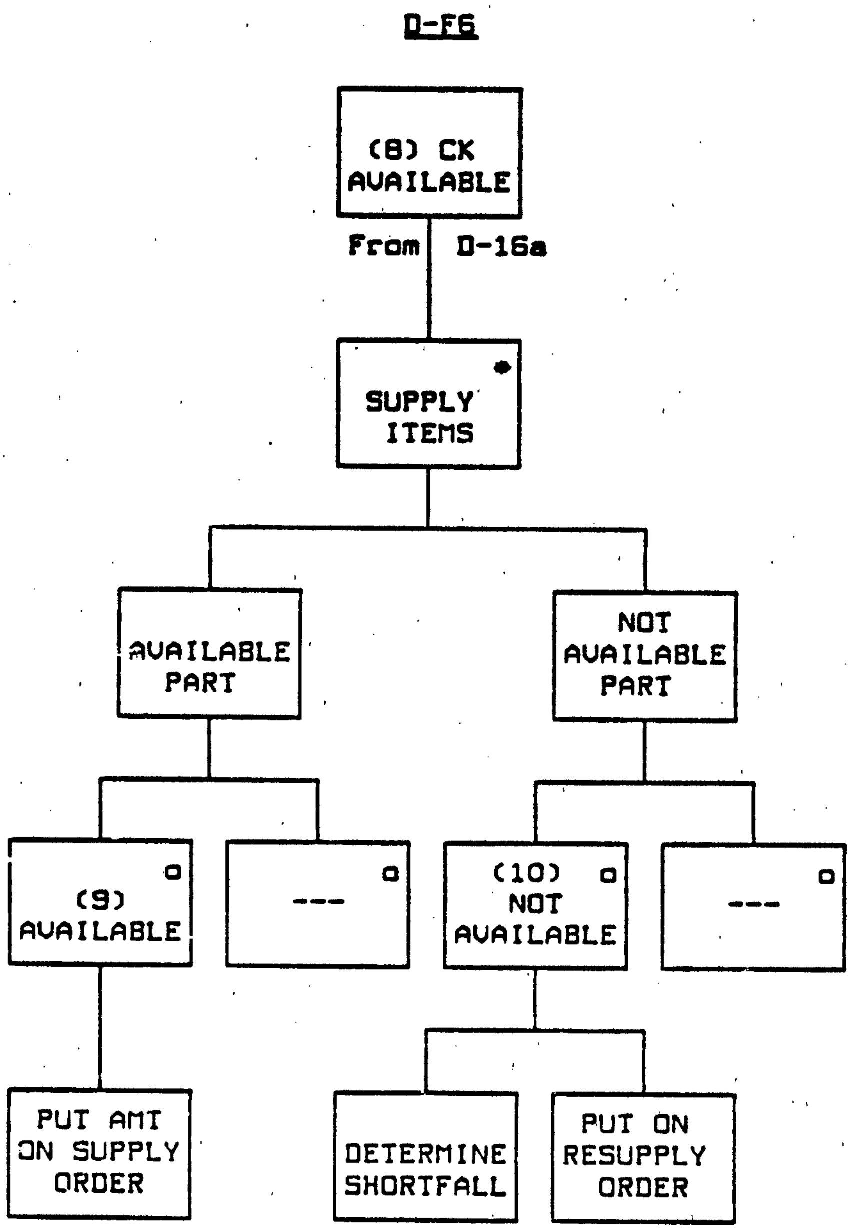

Figure D-16c. F-JF-RQMT generator (continued)

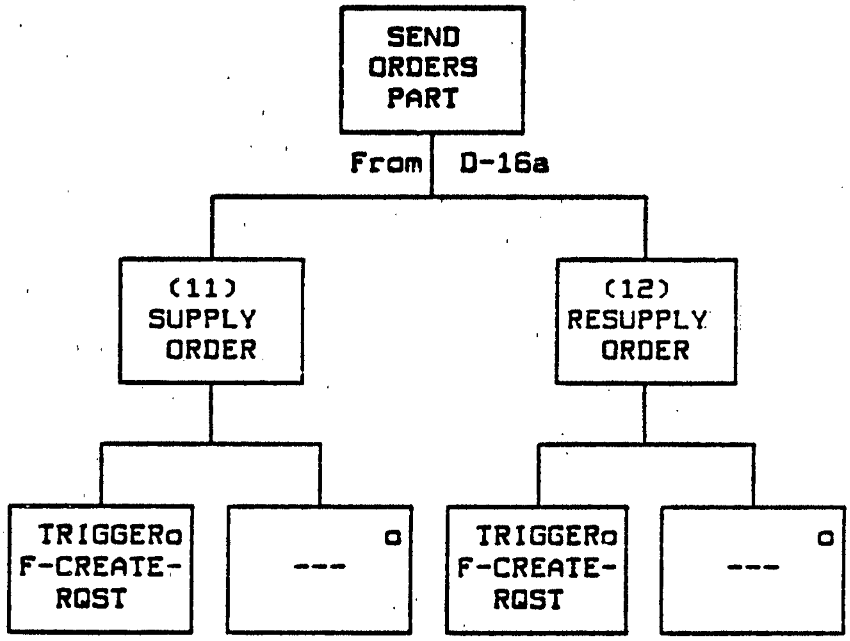

Figure D-16d. F-JF-RQMT generator (continued)

D-F6

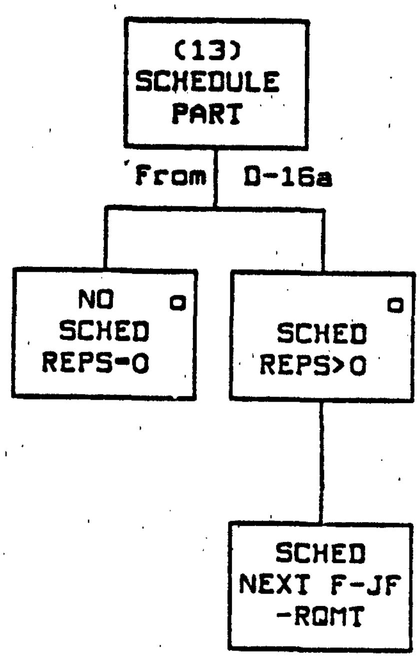

Figure D-16a. F-JF-RQMT generator (continued)

GENERATOR DESCRIPTION: F-JF-RQMT

1. ORDER TYPE. Read input data (DI/D2) to determine if job fill (JF) order were received via COMMO (D1: new order) or a previously scheduled order (D2: repeat order). Also, if a new order, was it scheduled to be sent now or later.

2. NEW ORDER. If received via COMMO (D1), assign an order number. (Note: The host model must have a utility routine to handle the assigning and creating order numbers).

3. SCHEDULE TIME. Compare the schedule time input with the new order to the current time to determine if the order(s) is/are to be sent now or later.

4. SCHEDULE FOR NOW. If scheduled for now (D1), determine the number of times the order was to be sent altogether. If more than once, the order data including repetitions are stored on the special order file (D3a) for later access.

5. SCHEDULE FOR LATER. If scheduled to start later, put the order on the special order file (D3a) and exit.

6. REPEAT ORDER. If prompted by the scheduler (D2), read the data (D3b) for order from file (S4).

7. ORDER NOW. If the order were scheduled for now, create an ALLOCATION by triggering A-CREATE-ALLOC (D6: D-A6) at the SUPPLIER unit and increase the due-in at the SUPPLY-CUSTOMER for the amount of each order by triggering A-PLACE-ORDER (D7: D-A1).

8. CHECK AVAILABLE. Cycle through the supply items at the SUPPLIER checking the availability of the needed supplies that are currently available and not committed (S5).

9. SOME AVAILABLE. If some of an item are available at the SUPPLIER (S5), put them into a local order list to be sent to the SUPPLY-CUSTOMER ASAP (if transportation support is available).

10. SOME NOT AVAILABLE. If part of the ordered amount were not available (S5), put any of the order not available or due-in at the SUPPLIER into a local order list for the supplying unit's normal SUPPLIER.

F-JF-RQMT (cont.)

11. SUPPLY ORDER. If an order were created for the receiving unit during the above cycle, request transportation (D8: F-CREATE-RQST (C-F1)). If the request flag (D9) indicates the request were created, invoke F-DIRECT-RQST (C-F2). Decrement the repetitions for the order. If repetitions are now zero, remove from order file (Note: The host model must provide the routines for managing the special order file..

12. RESUPPLY ORDER. If an order were created for resupplying the SUPPLIER, request transportation (D8: F-CREATE-RQST (C-F1)). If the request flag (D9) indicates the request were created, invoke F-DIRECT-RQST (C-F2).

13. SCHEDULE. If the number of times the order remains to be sent is more than zero, schedule its next occurrence (D10).

D-F7 F-C2-MEI TYPE: Interactive Function

SUMMARY: This function is prompted an hour (default) after the last MEI battle loss report is sent by a manuever unit. Each unit's MEI loss report is reviewed and a decision is made concerning the requisition of lost items. F-SUPPLY-RQST (D-F11) is called to cycle through the system types on the list and check the availability of the MEI at the SUPPLIER, the control status, and the availability of substitutes. The end result may or may not be a requisition. If a requisition is determined to be necessary, than the MEI are checked for WSRO items in F-WSRO-SPLY-RQD (D-F8). WSRO items are checked for required supplies which are added to the requisition. (Note: No check is made of the control status of the supplies going into the WSRO MEI. If this is later deemed necessary, the check should be done using F-SUPPLY-RQST for each supply type before adding them to the requisition and creating the ALLOCATION.) An ALLOCATION for the supplies is created at the SUPPLIER for the SUPPLY-CUSTOMER (A-CREATE-ALLOC, D-A6). Availability of ammo, fuel and crews for WSRO MEI are checked in F-WSRO-SPLY-AVL (D-F9) and F-WSRO (E-F2). Any currently available MEI or complete WSRO items are found and an order for delivering them to the SUPPLY-CUSTOMER is passed to transportation in F-SHIP-AVAIL (D-F10). Any remainder (not filled) is aggregated into one order and sent to transportation for movement from the supply base's SUPPLIER (usually corps down to division). (Note: As MEI supplies and personnel are delivered to SUPPLIERs in the area, the ALLOCATION continues being filled. Once it is full, another transportation request is issued to deliver the remainder to the unit.)

TRIGGERED BY: Scheduler

D-F7

F-C2-MEI (cont.)

RESULTING IN:	SUPPLY-CUSTOMER	(D-E1)	
	A-PLACE-ORDER	(D-A1)	
	SUPPLY-CUSTOMER	(D-E1)	
	SUPPLIER	(D-E2)	
	ALLOCATION	(D-E3)	
	A-CREATE-ALLOC	(D-A6)	
	A-COMMIT-ALLOC	(D-A7)	
	A-SUPPLY-ALLOC	(D-A14)	
	F-SUPPLY-RQST	(D-F11)	
	F-WSRO-SPLY-RQD	(D-F8)	
	F-WSRO-SPLY-AVLAIL	(D-F9)	
	F-SHIP-AVAIL	(D-F10)	
	F-WSRO	(E-F2)	Personnel
	F-CREATE-TASK	(C-F1)	Transportation
	(COMMO module implied action: A-SEND-MESSAGE)		

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-17.

D-F7

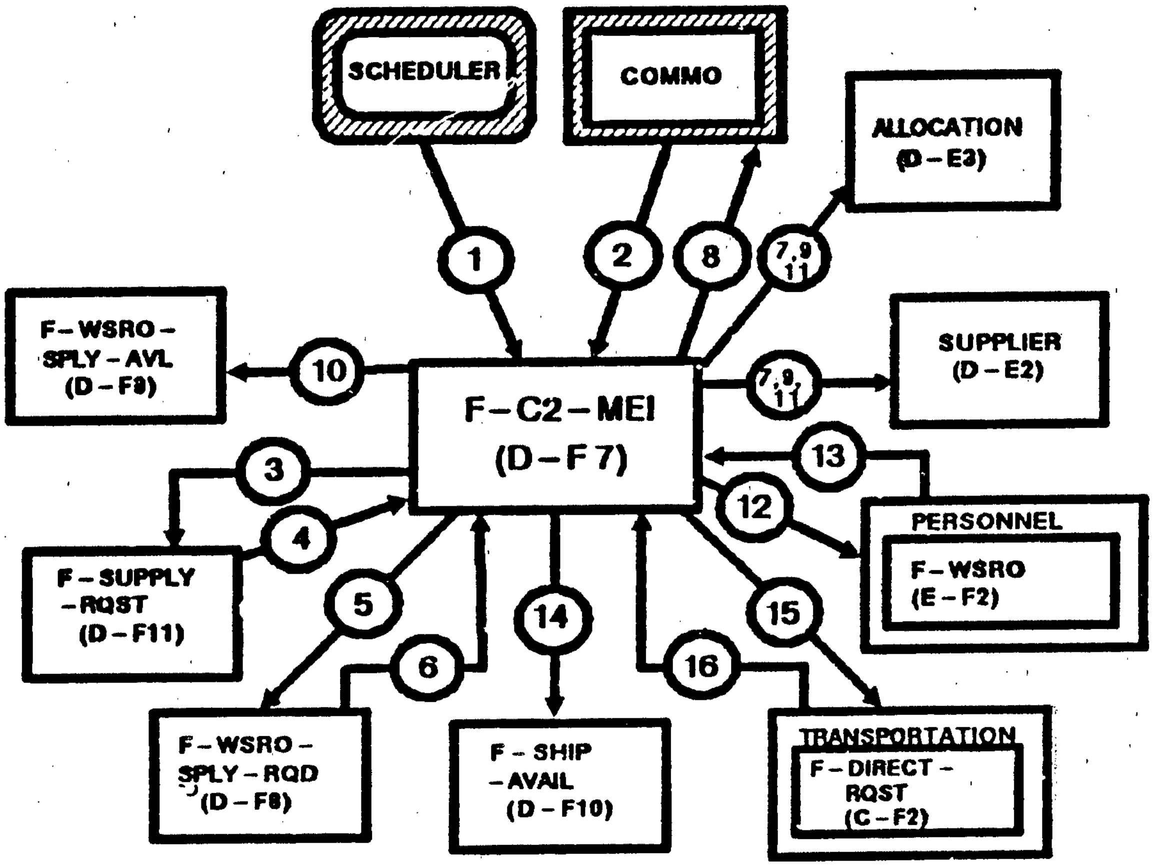

FIGURE D-17. F-C2-MEI SSD

D-F7

DATA DEFINITION: F-C2-MEI

Connection Number	Data Transferred	Comments:
D1	SCHEDULER prompt:	
	o Time	Scheduled event time. COMMO msg containing unit MEI battle losses.
D2	Information on each battle loss report message:	
	o Unit ID	Unit with MEI losses.
	o MEI loss list	(System#, quantity)*.
D3	Parameters passed to F-SUPPLY-RQST (D-F11):	
	o Unit ID	Unit that suffered the losses.
	o SUPPLIER ID	MEI supply base for unit.
	o MEI loss list	(Supply type, item#, quantity)*.
D4	Return parameters from F-SUPPLY-RQST (D-F11):	
	o Validated order	(Supply type, item#, quantity)*, if any.
	o No-fill list	(Supply type, item#, quantity)*, if any.
D5	Parameters passed to F-WSRO-SPLY-RQD (D-F8):	
	o MEI list	(System#, quantity)* on requisition.
D6	Information returned by F-WSRO-SPLY-RQD (D-F8):	
	o WSRO MEI list	(System#,quantity)*.
	o Non WSRO MEI list	(System#,quantity)*.
	o Ammunition list	(Ammo ID,quantity)*, required.
	o Fuel list	(Fuel ID,quantity)*, required.

DATA DEFINITION: F-C2-MEI (cont.)

Connection Number	Data Transferred	Comments:
D7	Trigger A-CREATE-ALLOC (D-A6):	
	o SUPPLY-CUSTOMER ID	ALLOCATION owner.
	o SUPPLIER ID	" location.
	o Order list	(Supply type, item#, quantity)*.
D8	Message to SUPPLY-CUSTOMER via COMMO to trigger A-PLACE-ORDER (D-A1):	
	o SUPPLY-CUSTOMER ID	
	o Order list	(Supply type, item#, quantity)*.
D9	Trigger A-COMMIT-ALLOC (D-A7):	
	o Ammo/fuel SUPPLIER ID	Where supplies are.
	o SUPPLIER ID	ALLOCATION location.
	o ALLOCATION ID	
	o Supply fill	(Supply type, item#, quantity)* that goes toward filling the remaining ALLOCATION requirements.
D10	Information passed to F-WSRQ-SPLY-AVL (D-F[illegible]):	
	o SUPPLY-CUSTOMER ID	ALLOCATION owner.
	o SUPPLIER ID	" location.
	o ALLOCATION ID	
D11	Information passed to trigger A-SUPPLY-ALLOC (D-[illegible]).	
	o MEI SUPPLIER ID	
	o Ammo/fuel SUPPLIER	MEI SUPPLIER's.
	o ALLOCATION ID	
	o Supplies transferred	

DATA DEFINITION: F-C2-MEI (cont.)

Connection Number	Data Transferred	Comments:
D12	Parameters sent in personnel request, F-WSRQ (E-F2):	
	o SUPPLIER ID	Personnel CUSTOMER.
	o SUPPLY-CUSTOMER ID	MEI SUPPLY-CUSTOMER.
	o ALLOCATION ID	Used to identify the personnel request.
	o MEI order list	(System#, quantity)*.
D13	Information returned from personnel, F-WSRQ (E-F2):	
	o Crew list	(System#,quantity)*, available.
D14	Parameters passed to F-SHIP-AVAIL (D-F10):	
	o SUPPLY-CUSTOMER ID	ALLOCATION owner.
	o MEI SUPPLIER ID	" location.
	o ALLOCATION ID	
D15	Transportation request for shipping demands (F-CREATE-RQST):	
	o SUPPLY-CUSTOMER ID	Destination unit.
	o SUPPLIER ID	Starting point.
	o Order list	(Supply type, item#, quantity)*.
	o Order type	Normal, emergency or ALLOCATION.
D16	Response from transportation:	
	o Request flag	0 = request not created. 1 = request created.

D-F7

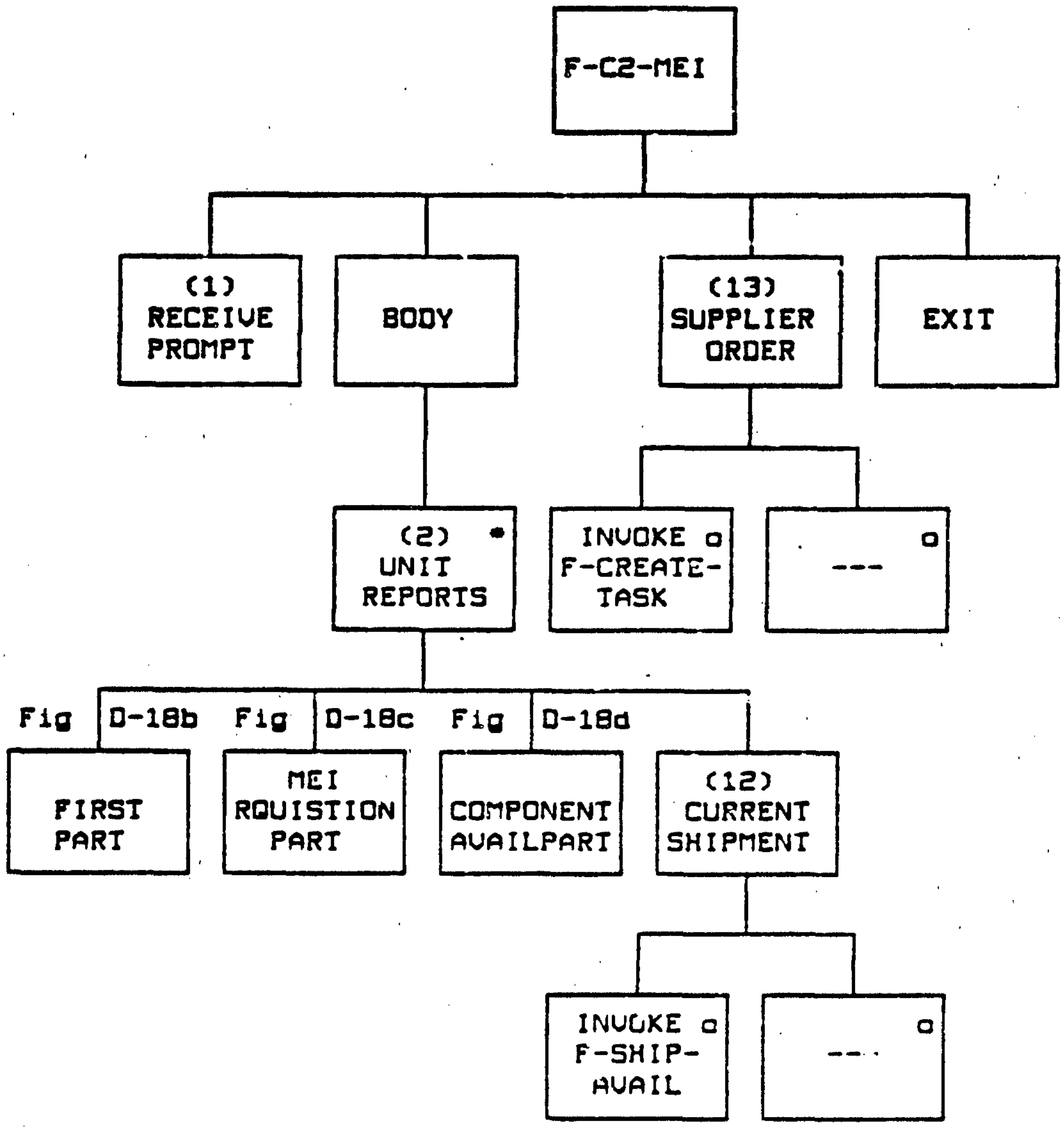

Figure D-18a. F-C2-MEI generator

D-F7

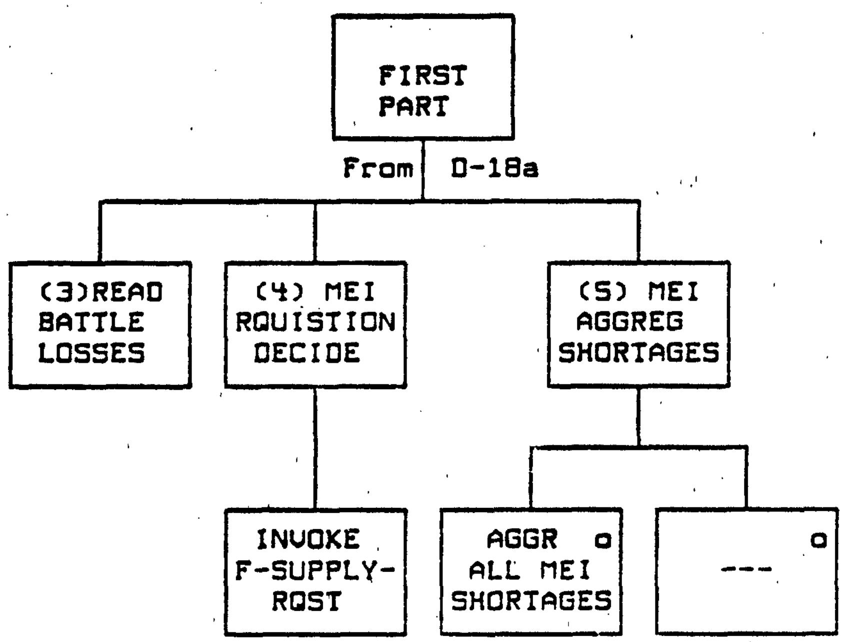

Figure D-18b. F-C2-MEI generator (continued)

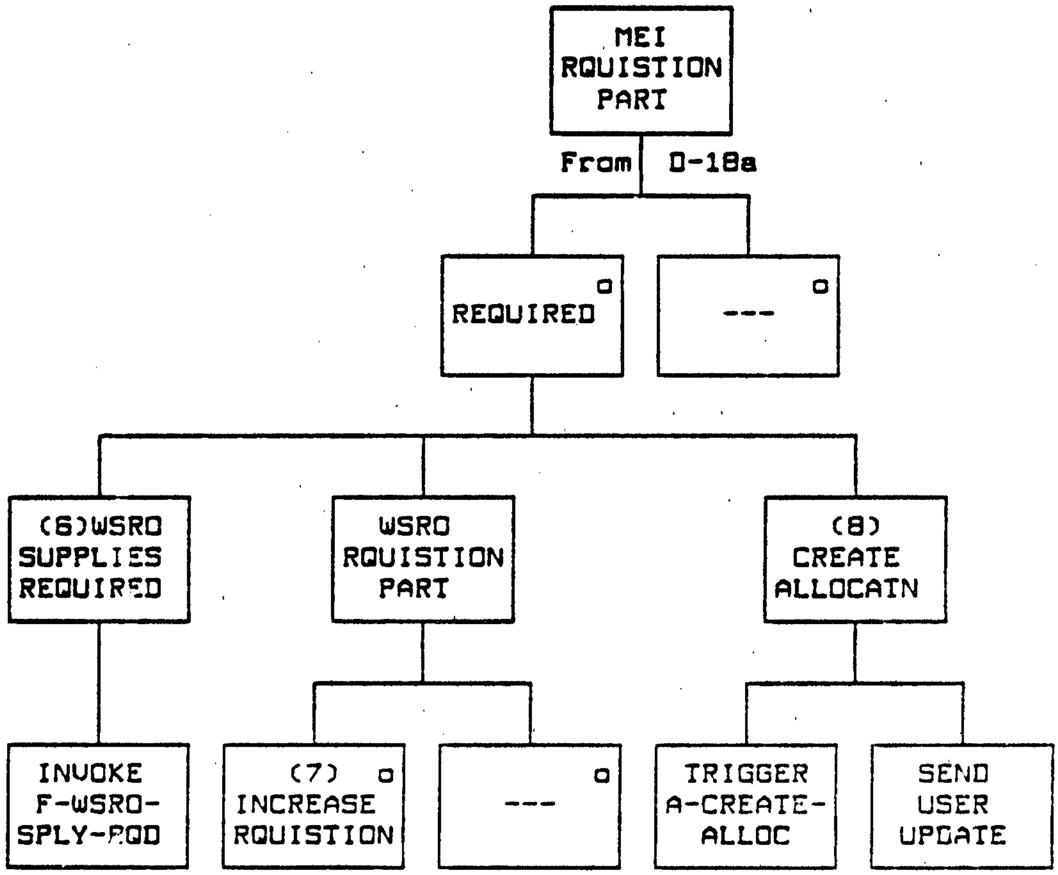

Figure D-18c. F-C2-MEI generator (continued)

D-F7

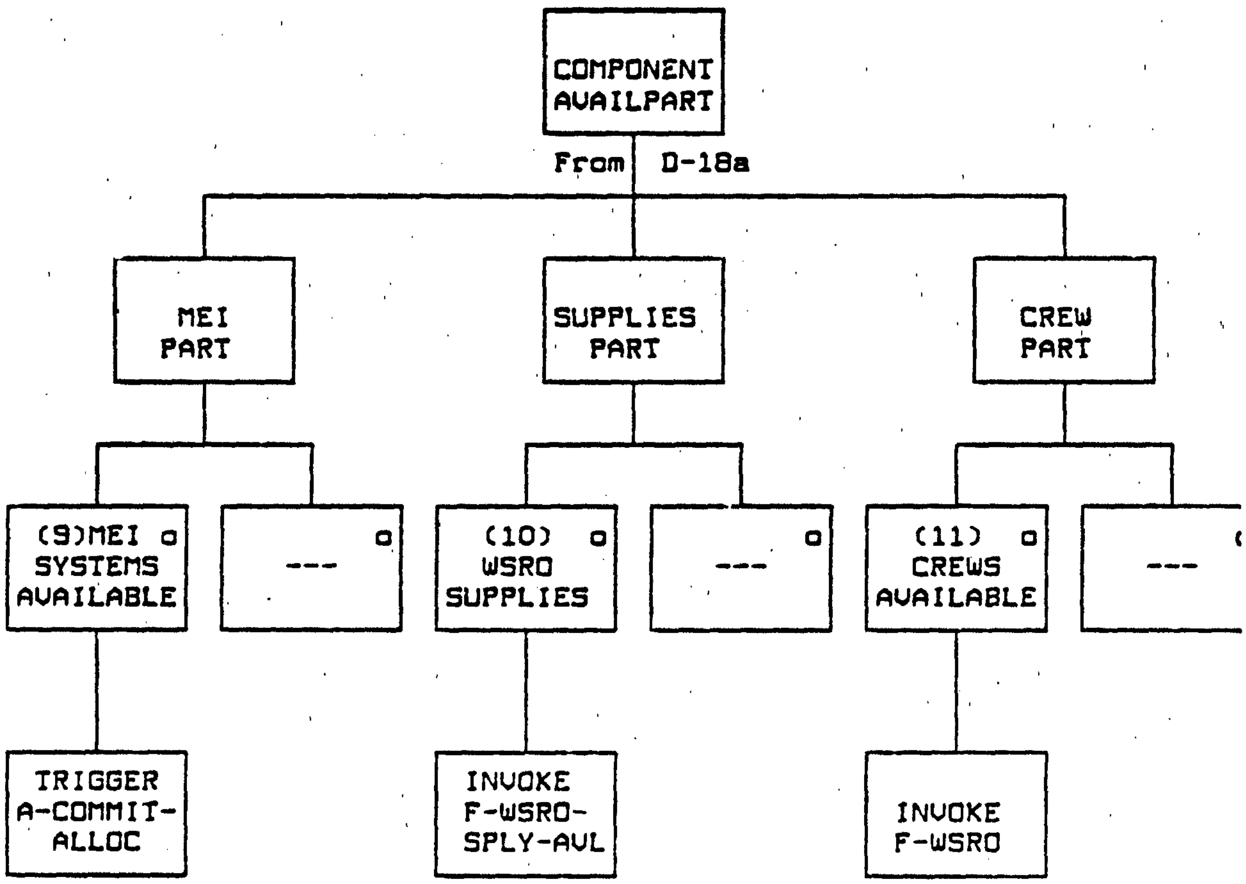

Figure D-18d. F-C2-MEI generator (continued)

GENERATOR DESCRIPTION: F-C2-MEI

1. RECEIVE PROMPT. Receive prompt from scheduler for reading the MEI battle loss report messages from MEI user units (D1).

2. UNIT REPORTS. Begin cycling through the unit MEI battle loss reports contained in the COMMO messages (D2).

3. READ MEI BATTLE LOSSES. Read an incoming COMMO message containing the input parameters (D2) for a unit's MEI losses.

4. MEI REQUISITION DECISION. Invoke F-SUPPLY-RQST (D3: D-F11)) to decide whether an MEI requisition is to be authorized. F-SUPPLY-RQST cycles through the MEI types lost by a unit, checking on its availablity at the SUPPLIER, determining its control status, and making any substitutions, when necessary and available (assigned during data input). Depending on the unit's situation and the MEI status, it typically returns (D4) a requisition for the required MEI types and quantities. (Note: Controlled MEI are issued, denied, or substituted for, based on the unit's total issue of the MEI type so far today compared to its alloted amount for the day. Noncontrolled MEI are issued on an (FIFO) basis unless they become scarce, then they become controlled.)

5. MEI AGGREGATE SHORTAGES. As each unit's order is processed, accumulate any MEI on the no-fill list into an aggregated order. If an order is created, it is submitted for transportation support in paragraph 13.

6. WSRO SUPPLIES REQUIRED. If any WSRO MEI are in the requisition, invoke F-WSRO-SPLY-RQD (D5: D-F3). This function cycles through the MEI list separating it into WSRO and non-WSRO lists. For WSRO MEI, it determines and lists the ammo/fuel requirements. The resulting lists are returned (D6) to this function.

7. INCREASE REQUISITION. Place any ammunition/fuel requirements and their quantities on a requisition list for inclusion in the ALLOCATION requirements in paragraph 8.

8. CREATE ALLOCATION. Trigger A-CREATE-ALLOC (D7: D-A6) to create a reservation of the required supplies for the unit, and then send a COMMO message (D8) to the unit to verify the ALLOCATION. This message triggers A-PLACE-ORDER (D-A1) which updates the SUPPLY-CUSTOMER's due-ins and total issue so-far-today for each supply item.

9. MEI SYSTEMS AVAILABLE. If available MEI were returned from F-SUPPLY-RQST at 4., commit those at the MEI SUPPLIER to the ALLOCATION by triggering the action A-COMMIT-ALLOC (D9: D-A7).

F-C2-MEI (cont.)

10. WSRO SUPPLIES AVAILABLE. If any WSRO MEI are in the requisition, invoke F-WSRO-SPLY-AVL (D10: D-F9). This function determines the availability of required WSRO (ammo/fuel) supplies. If not available at the MEI SUPPLIER, it attempts to get them from the MEI SUPPLIER's ammo/fuel supplier(s). Any available, noncommitted supplies requested are put into the ALLOCATION (A-SUPPLY-ALLOC, D11: D-A14).

11. CREWS AVAILABLE. If WSRO MEI are required, invoke F-WSRO (D12: E-F2) to request any crews from the personnel module. The number of crews per MEI type are returned (D13), so the number of MEI (WSRO and non-WSRO) available now can be determined. (Note: any personnel required to crew the MEI remain with the personnel module until the transportation unit (TU) arrives to transport the WSRO MEI and is loaded with the supplies currently committed to the ALLOCATION.)

12. CURRENT SHIPMENT. If any of the ALLOCATION is available now, invoke F-SHIP-AVAIL (D14: D-F10). This function determines the amount of a requisition currently available for immediate shipment and submits the order to transportation (D15). Again, if any WSRO is included, it must be complete to include whatever MEI, ammunition, fuel, and crew required. If the request flag indicates that the request were created, invoke F-DIRECT-RQST(C-F2).

13. SUPPLIER ORDER. Once the last unit is treated, if an aggregated MEI were developed, send it to tranportation (D15) to move the supplies down to the MEI SUPPLIER. If the request flag indicates that the request were created, invoke F-DIRECT-RQST(C-F2). Exit.

D-F8 F-WSRO-SPLY-RQD TYPE: Interactive Function

SUMMARY: This function checks through the list of MEI on a unit's requisition looking for WSRO systems. If WSRO MEI are part of the requisition, it finds the ammunition/fuel supplies normally required by the WSRO MEI. (Note: If later it should become desirable to control the supplies going into the WSRO MEI, the supply requirments determined here should be fed to F-SUPPLY-RQST (D-F11) to get an approved list before creating the ALLOCATION. This will require adding the fill and no fill lists together before doing so.)

TRIGGERED BY: F-C2-MEI (D-F7)

RESULTING IN: Lists of WSRO MEI, non WSRO MEI, WSRO component (ammo/ fuel) supply requirements in a unit requisition.

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-19.

D-F8

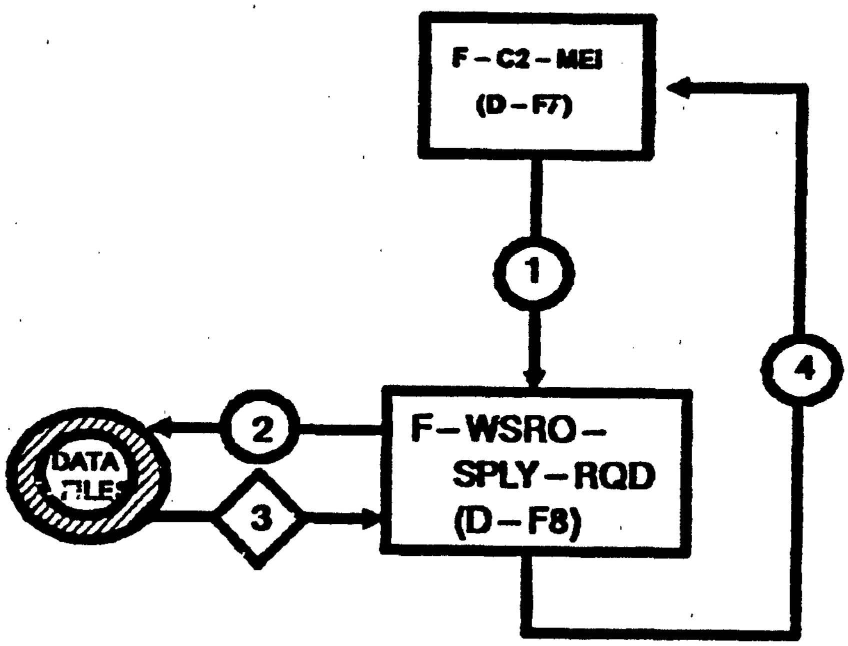

FIGURE D-19. F-WSRO-SPLY-RQD SSD

D-F8

DATA DEFINITION: F-WSRO-SPLY-RQD

Connection Number	Data Transferred	Comments:
D1	The parameter received from routine F-C2-MEI (D-F7):	
	o MEI list	(System#,quantity)* in requisition.
D2	The parameter needed to get WSRO MEI ammunition and fuel basic loads from data file (D-DF11):	
	o WSRO MEI ID	
D3	Information returned from data file (D-DF11):	
	o Ammo list	(Ammo ID, quantity)* for MEI.
	o Fuel	Fuel ID, quantity for MEI.
D4	Information returned to F-C2-MEI (D-F7):	
	o WSRO MEI list	(System#,quantity)*.
	o Non WSRO MEI list	(System#,quantity)*.
	o Component supplies	(Supply ID, item#, quantity)*.

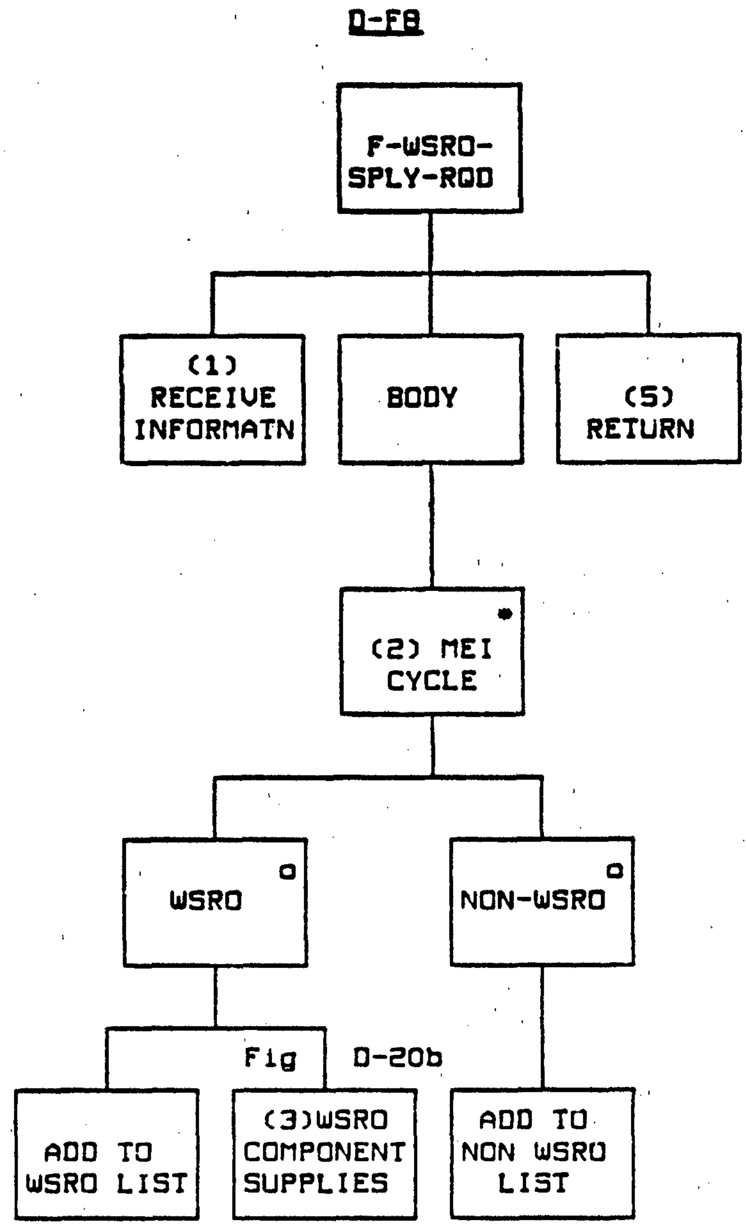

Figure D-20a. F-WSRO-SPLY-RQD generator

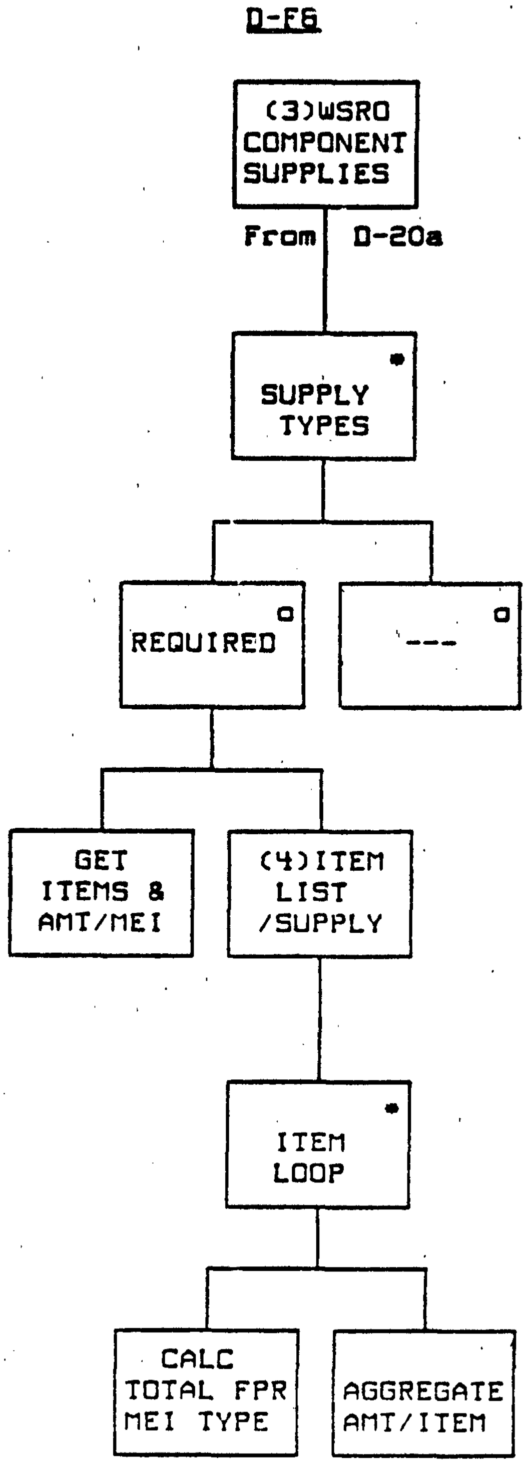

Figure D-20b. F-WSRO-SPLY-RQD generator (continued)

D-F8

GENERATOR DESCRIPTION: F-WSRO-SPLY-RQD

1. RECEIVE INFORMATION. The invoking routine, F-C2-MEI (D-F7), sends the list of MEI on the requisition for filling the unit's MEI battle losses (D1).

2. MEI CYCLE. Begin looping through the MEI list, checking for WSRO MEI (D2/S3). If a WSRO MEI is found, enter it on a WSRO MEI requirement list and continue. Otherwise, put the MEI on the non WSRO requirement list an go to 5.

3. WSRO COMPONENT SUPPLIES. Check the basic load data file (D2/S3) for any component supplies for the WSRO MEI by looping through the possible supply types (ammo/fuel). (Note: If none exist, the iteration is zero, so the process goes to 5.) If a supply type has items in the WSRO MEI basic load, get the list of items and amounts of the supply type for each MEI basic load (D2/S3).

4. ITEM LIST PER SUPPLY TYPE. Cycle through the items of the supply type, multiplying the quantity in the basic load times the quantity of the MEI type. Aggregate the sum into an array by supply type and item.

5. RETURN. The WSRO MEI, non-WSRO MEI, and the aggregated component supply (ammo/fuel) requirement lists are returned to the calling routine, D-C2-MEI (D4).

D-F9 F-WSRO-SPLY-AVL TYPE: Interactive Function

SUMMARY: This function checks the availability of a required WSRO supply component (ammunition or fuel) at the MEI supply base. If the amount available is not enough, an attempt is made to get the remaining requirement from the MEI supply base's closest ammunition/fuel supplier. Any of the required supply available is placed on an ALLOCATION update list and committed to the ALLOCATION.

TRIGGERED BY:	F-C2-MEI	(D-F7)
RESULTING IN:	SUPPLIER	(D-E2)
	ALLOCATION	(D-E3)
	A-COMMIT-ALLOC	(D-A7)
	A-SUPPLY-ALLOC	(D-A14)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-21.

D–F9

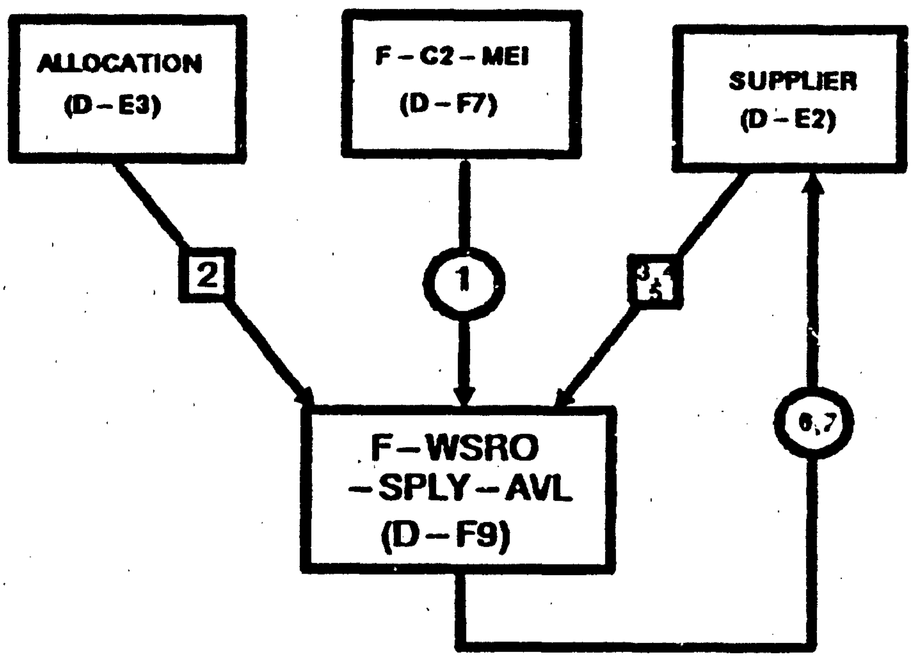

FIGURE D–21. F–WSRO–SPLY–AVL SSD

D-F9

DATA DEFINITION: F-WSRO-SPLY-AVL

Connection Number	Data Transferred	Comments:
D1	Information from invoking function F-C2-MEI (D-F7):	
	o SUPPLY-CUSTOMER ID	ALLOCATION owner.
	o MEI SUPPLIER ID	ALLOCATION location.
	o ALLOCATION ID	
S2	Information needed from the ALLOCATION about required supply components:	
	o Supply type	Ammo/fuel.
	o Requirement list	(Item#, quantity)*.
	o Committed list	(Item#, quantity)*.
S3	Information needed from the MEI SUPPLIER about available supplies:	
	o MEI SUPPLIER ID	
	o SUPPLIER ID's	Ammo/fuel.
	o Supply type	Ammo/fuel.
	o Available list	(Item#, quantity)*, not committed.
S4	Information needed about the MEI SUPPLIER ammo status:	
	o Ammo SUPPLIER ID	
	o Available list	(Item#, quantity)*, not committed.
S5	Information needed about the MEI SUPPLIER fuel status:	
	o Fuel SUPPLIER ID	
	o Available list	(Item#, quantity)*, not committed.
D6	Trigger A-SUPPLY-ALLOC (D-A14) from local SUPPLIER to MEI SUPPLIER:	
	o MEI SUPPLIER ID	ALLOCATION owner.
	o SUPPLIER ID	ALLOCATION location.
	o ALLOCATION ID	
	o Supplies	(Supply type, item#, transferred quantity)*.

DATA DEFINITION: F-WSRO-SPLY-AVL (cont.)

Connection Number	Data Transferred	Comments:
D7	Trigger A-COMMIT-ALLOC (D-A7) to reserve the supplies at the MEI SUPPLIER:	
	o SUPPLIER ID	Where supplies located.
	o SUPPLIER [illegible]	ALLOCATION [illegible].
	o ALLOCATION ID	
	o Supply fill list	(Supply type, item#, quantity #.

D-F9

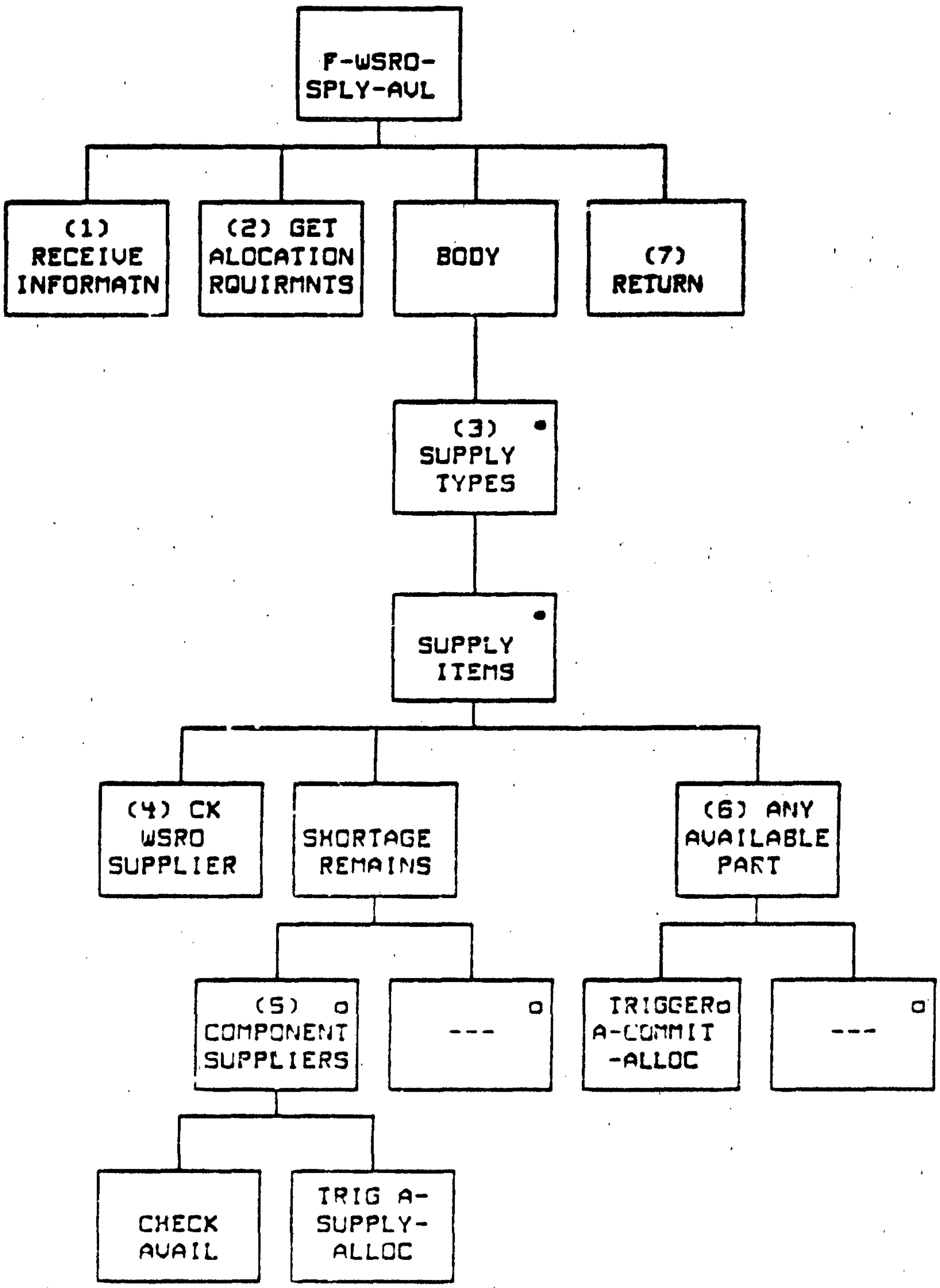

Figure D-22. F-WSRO-SPLY-AVL generator

GENERATOR DESCRIPTION: F-WSRO-SPLY-AVL

1. RECEIVE INFORMATION. Read information received from the invoking function in D1.

2. GET ALLOCATION REQUIREMENTS. Check the ALLOCATION for component supply (ammo/fuel) requirements (S2). If any exist that are not filled, put them on a supply list by supply type and item.

3. SUPPLY TYPES. Cycle through the items for each supply type on the list. If there are none on the list, go to 7 (RETURN), otherwise continue.

4. CHECK WSRO SUPPLIER. First check for any of the supply item available (not committed) at the MEI SUPPLIER (S3). If some were available, reduce the amount required on the list for the item and save the amount to be committed to the ALLOCATION in 6. (Note: When an ALLOCATION is cancelled, the supplies remain at the MEI supply base. Also, if there were a fuel requirement, it could be available at the MEI SUPPLIER, because MEI are fueled at corps. Upon arrival of the fueled MEI at the MEI SUPPLIER, the fuel remaining is added into the fuel supplies and committed to the MEI's ALLOCATION.)

5. COMPONENT SUPPLIERS. Next, if there was not enough of the item at the MEI supplier, check the supply base's component SUPPLIER (S4) and implicitly transfer any of the available, noncommitted supply item to the MEI supply base by triggering A-SUPPLY-ALLOC (D6: D-414).

6. ANY AVAILABLE. If any of the supply items were found either at the MEI or component SUPPLIER, commit them to the ALLOCATION with [illegible] COMMIT ALLOC [illegible].

7. RETURN. No information is passed back to the invoking function. The purpose of the routine is to find any of the available required supplies and put them into the SUPPLY-CUSTOMER's ALLOCATION at the SUPPLIER.

(Note: If the supplies going into the WSRO MEI are, at some later date, to be checked against the unit's ammunition control allotment, this function will need to be changed along with F-C2-MEI, F-WSRO-SPLY-RQD and F-SUPPLY-RQST. In that case, suggest that the MEI requisition returned to F-C2-MEI by F-SUPPLY-RQST be sent to F-WSRO-SPLY-RQD to provide lists of required supplies for the WSRO MEI. These lists are fed to F-SUPPLY-RQST to get approved supply requirements lists before creating the ALLOCATION with the MEI and supply requirements and the quantities presently available.)

D-F10 F-SHIP-AVAIL TYPE: Interactive Function

SUMMARY: This function determines the amount of an ALLOCATION that is available for immediate shipment and creates the shipment order. This includes any non WSRO MEI and any complete "ready to fight" (armed, fueled, and crewed) WSRO MEI.

TRIGGERED BY:	F-C2-MEI	(D-F7)	
RESULTING IN:	F-CREATE-RQST	(C-F1)	Transportation
	F-DIRECT-RQST	(C-F2)	Transportation

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-23.

D-F10

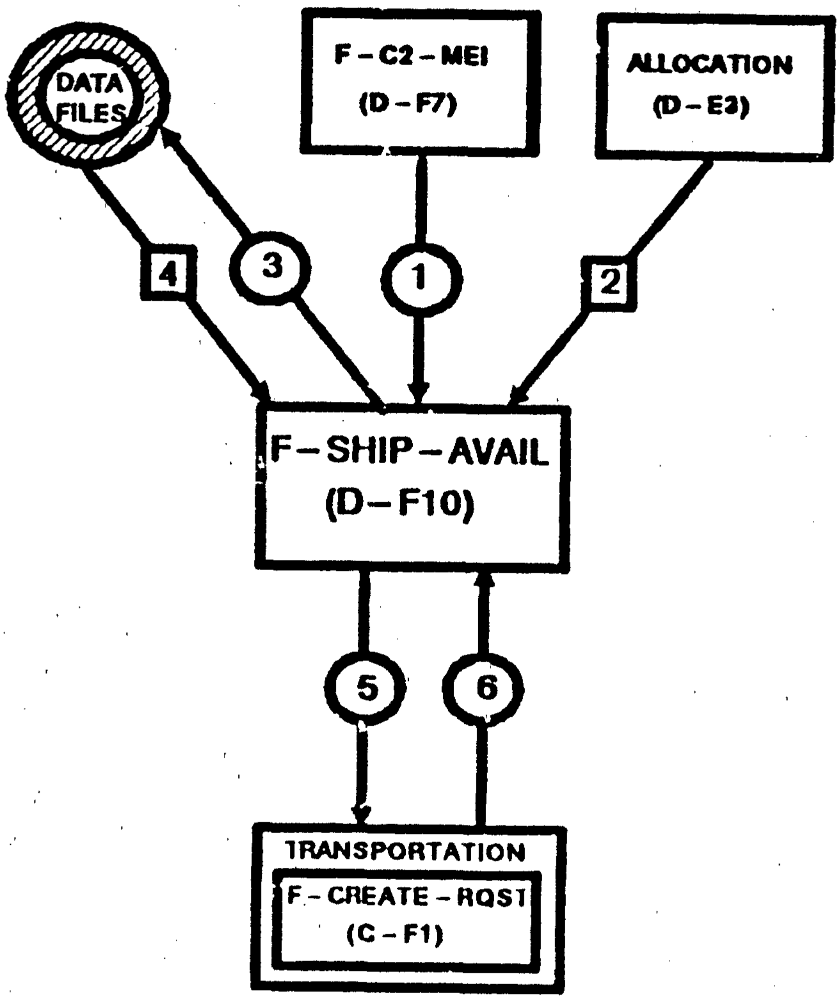

FIGURE D-23. F-SHIP-AVAIL SSD

DATA DEFINITION: F-SHIP-AVAIL

Connection Number	Data Transferred	Comments
D1	Information received from F-C2-MEI, D-F7:	
	o SUPPLY-CUSTOMER ID	ALLOCATION owner.
	o SUPPLIER ID	ALLOCATION location.
	o ALLOCATION ID	
S2	Information needed from the ALLOCATION:	
	o Non-WSRO MEI	(System#,quantity)*, available.
	o WSRO MEI	(System#,quantity)*, available.
	o Crews	(System#,quantity)*, available.
	o Ammo/fuel	(Supply type, item#, quantity)*,available
D3	Parameters passed to access data file (D-DF11) at D4:	
	o MEI system ID	
S4	Date needed about each WSRO MEI component supply basic load:	
	o Ammo basic load	(Ammo#, quantity)*.
	o Fuel basic load	(Fuel#, quantity)*.
D5	Transportation request for immediate [illegible] on-hand quantity:	
	o Unit ID	
	o SUPPLIER ID	
	o Order list	(Supply type, item#, quantity)*.
	o Order type	Normal, emergency, or ALLOCATION.
D6	Transportation's response (F-CREATE-RQST: D-F1):	
	o Request flag	0 = request not created. 1 = request created.

D-F10

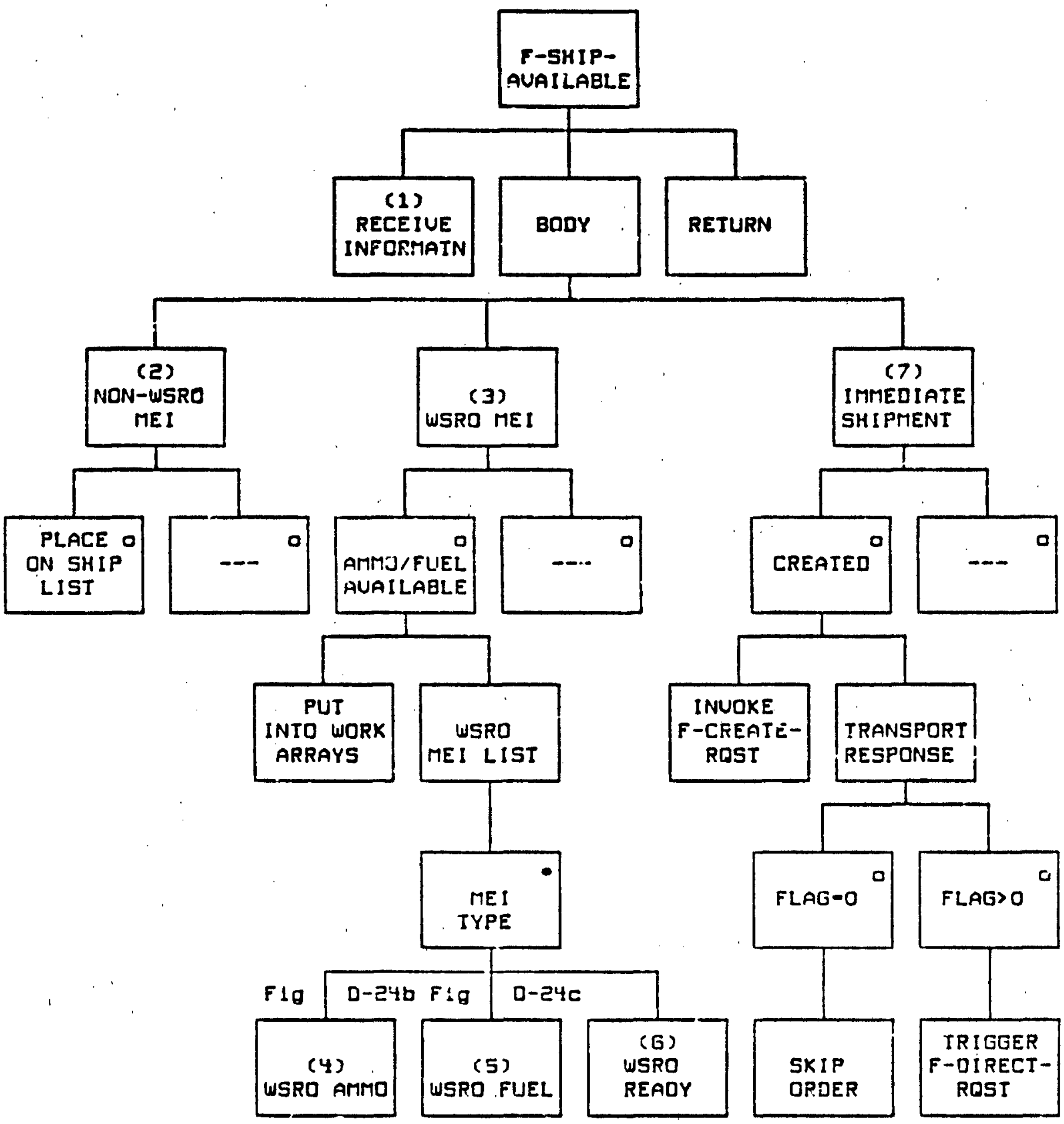

Figure D-24a. F-SHIP-AVAIL generator

D-F10

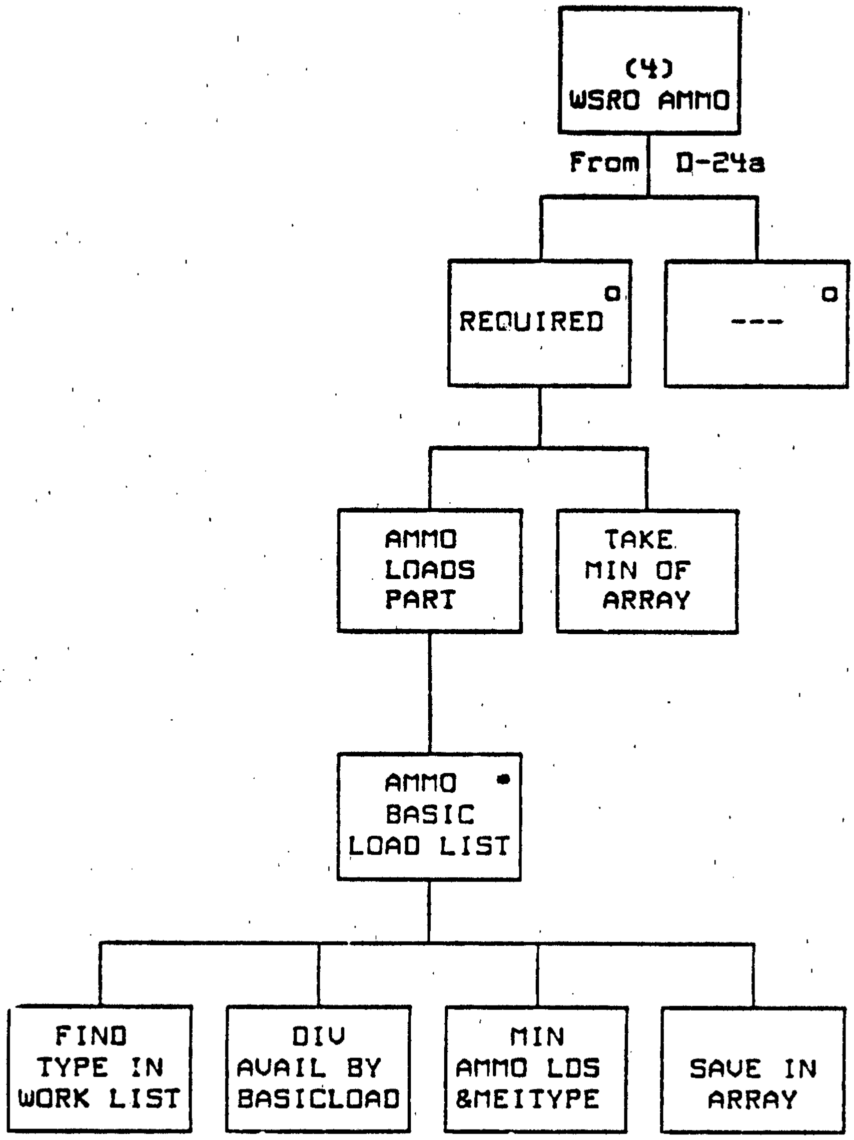

Figure D-24b. F-SHIP-AVAIL generator (continued)

D-F10

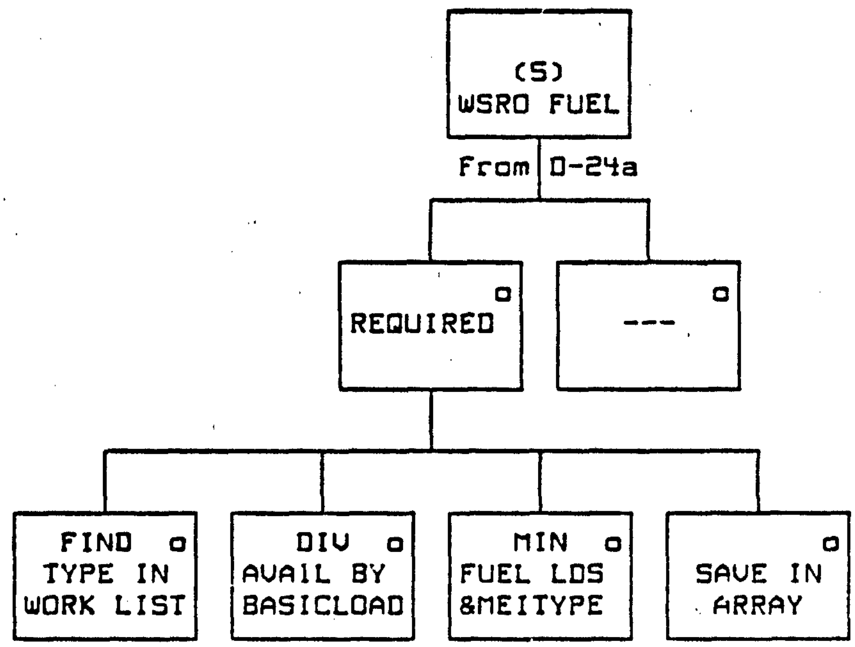

Figure D-24c. F-SHIP-AVAIL generator (continued)

D-F10

GENERATOR DESCRIPTION: F-SHIP-AVAIL

1. RECEIVE INFORMATION. Receive the information in D1 from F-C2-MEI. If any of the ALLOCATION is currently available, attempt to develop an order for immediate shipment to the SUPPLY-CUSTOMER.

2. NON-WSRO MEI. Check the ALLOCATION for any non-WSRO MEI available (S2). If there were any, put the items and quantity on the shipment order.

3. WSRO MEIs. If the order had WSRO MEI that required ammunition or fuel (S2) and some were available, load the list of ammunition/fuel committed to the ALLOCATION into local work arrays by supply type. Cycle through the list of WSRO MEI available in the ALLOCATION to find how many are complete (armed, fueled, and crewed) and ready for immediate shipment.

4. WSRO AMMUNITION. If the MEI required ammunition (S4), cycle through the list of ammunition types in the MEI basic load (D3/S4). (Note: It is assumed that the MEI are loaded into each unit type (SRC) by priority, and each ammunition type is loaded for each system by priority). Divide the amount of the ammunition type available by the amount of the ammunition type in the MEI type's basic load. This produces the total number of ammunition loads for the MEI type. Take the minimum of the number of loads and the number of the MEI and save it in a temporary array until all of the ammunition types for the MEI are similarly treated. Reduce the amount of the ammunition type on the work list by the number of loads set aside for the MEI type. Once through all of the ammunition types for the MEI, take the minimum of all the loads to determine the current number of the MEI armed. Save this figure for later use in finding how many complete WSRO MEI are available for shipment in 6.

5. WSRO FUEL. If the MEI required fuel (S4), divide the MEI type's basic load into the amount of the fuel type used to determine the number of the MEI tanks-full available. Take the minimum of the number of fuel tanks-full and the number of the MEI type. Save this figure for later use in finding how many complete WSRO MEI are available for shipment in step 6. Reduce the amount of the fuel type on the work list by the number of loads set aside for the MEI type, so there is not as much available for the next MEI.

6. WSRO READY. Determine the number of the WSRO MEI completed by finding the minimum number of MEI, crews, ammunition loads, and fuel loads. Place the MEI system and quantity on a shipment order. Reduce the quantity of ammunition and fuel available in the work arrays by the amount alloted to the MEI, so it is not available to the remaining WSRO MEI being checked. Continue cycling through the WSRO MEI until all are treated.

F-SHIP-AVAIL (cont.)

7. IMMEDIATE SHIPMENT. If a shipment order were created for currently available MEI for the SUPPLY-CUSTOMER, invoke F-CREATE-RQST (D5: C-F1) to request transportation support. If the request flag returned (D6) indicates that the request were created, invoke F-DIRECT-RQST (C-F2). Exit.

D-F11 F-SUPPLY-RQST TYPE: Interactive Function

SUMMARY: This process function cycles through the supply items requested by a SUPPLY-CUSTOMER. It checks the availability at the SUPPLIER and the control status of each item. It then makes necessary changes (validates) to the initial request, including making substitutions, when assigned and available. It may not allow some of the initial request if the controlled allotment (CA) limit is surpassed.

TRIGGERED BY:	F-C2-MEI	(D-F7)
	F-NONALLOC-ORDER	(D-F15)

RESULTING IN: Validated fill and no-fill lists.

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-25.

D-F11

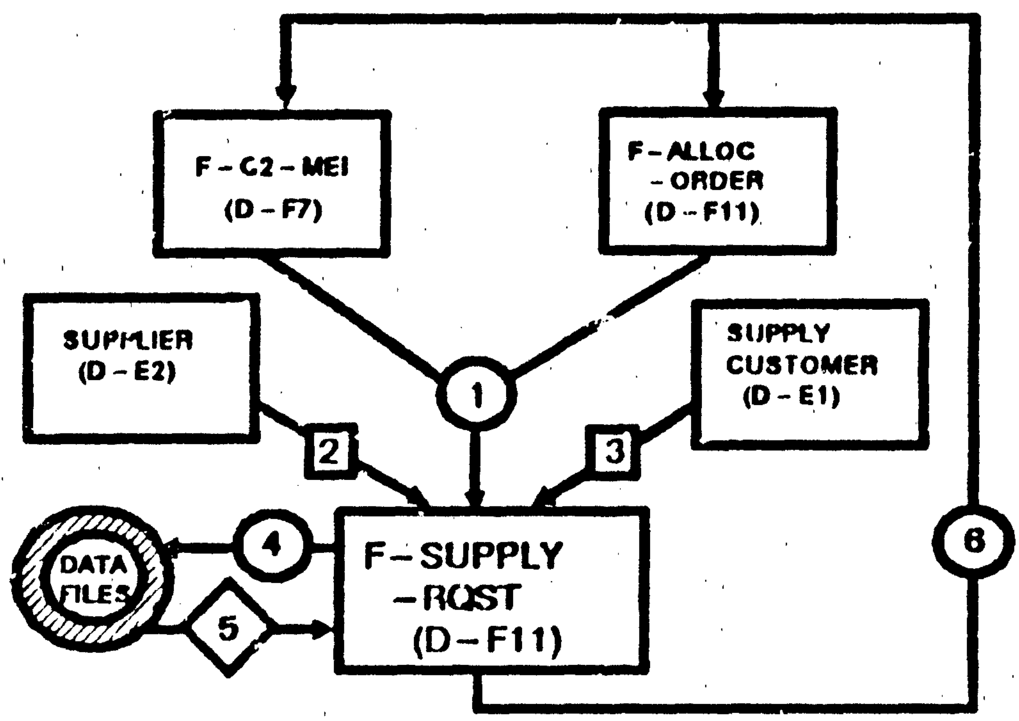

FIGURE D-25. F-SUPPLY-RQST SSD

DATA DEFINITION: F-SUPPLY-ROST

Connection Number	Data Transferred	Comments
D1	Parameters received from the invoking function:	
	o SUPPLY-CUSTOMER ID	Unit making request.
	o SUPPLIER ID	Unit filling request.
	o Request list	(Supply type, item#, quantity)*.
S2	Check the SUPPLIER's status:	
	o Movement flag	
	o Supply ID	
	o Supply item ID	
	o Amount on-hand	Amount available at the SUPPLIER.
	o Amount due-in	Noncommitted due-in (NCDI).
	o Control flag	Indicates if item is being controlled.
S3	Get SUPPLY-CUSTOMER data:	
	o Supply ID	
	o Supply item ID	
	o Control allotment	Amount of the item available for issue to the unit today.
	o Total issued today	Amount of the item issued so far today.
	o SUPPLIER IDs	All of the [illegible] SUPPLIERs for the supply type.
D4	Parameters needed to access data file [illegible]	
	o Supply ID	
	o Supply item ID	
S5	Data file (D-DF12) of substitutes for supply items:	
	o Substitute ID	

DATA DEFINITION: F-SUPPLY-RQST (cont.)

Connection Number	Data Transferred	Comments
D6	Parameters returned to the invoking function:	
	o Fill list	(Supply type, item#, quantity)*.
	o No-Fill list	(Supply type, item#, quantity)*.

D-F11

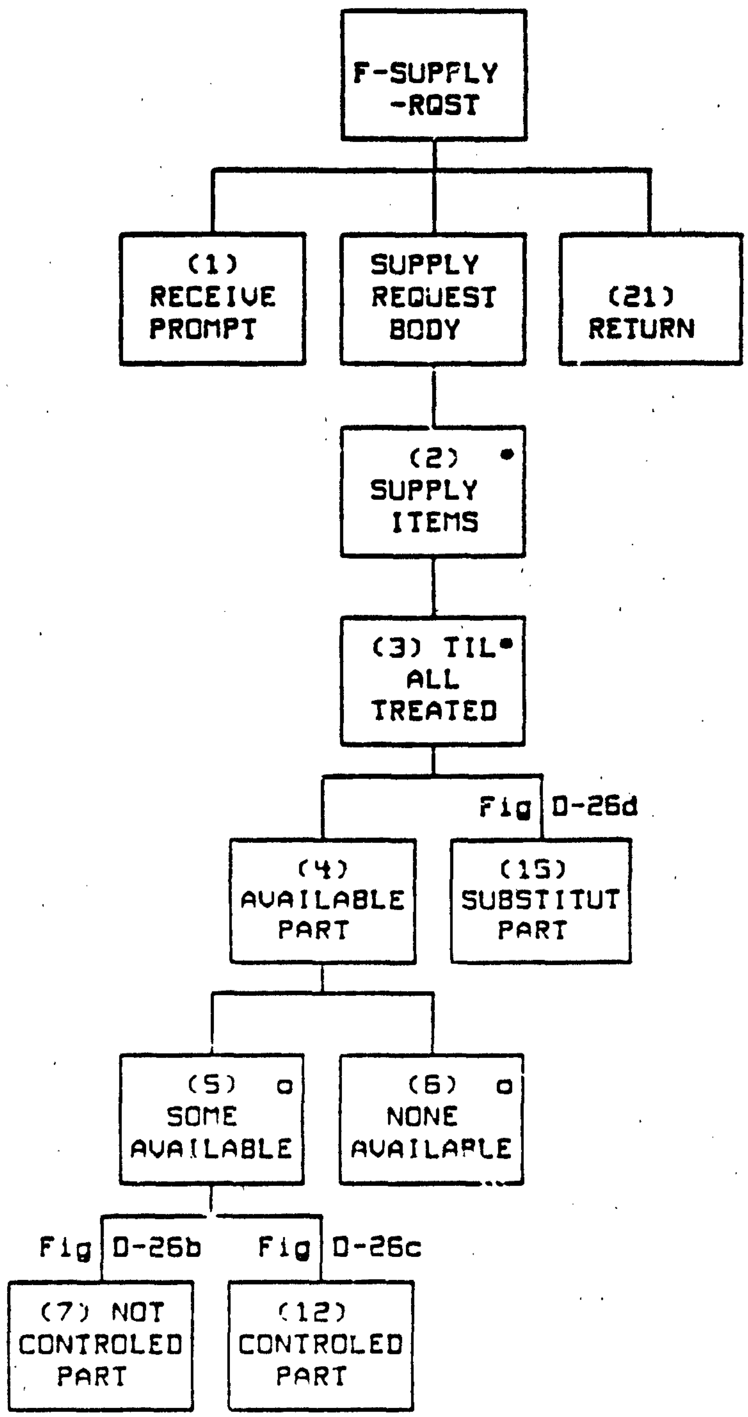

Figure D-26a. F-SUPPLY-RQST generator

D-F11

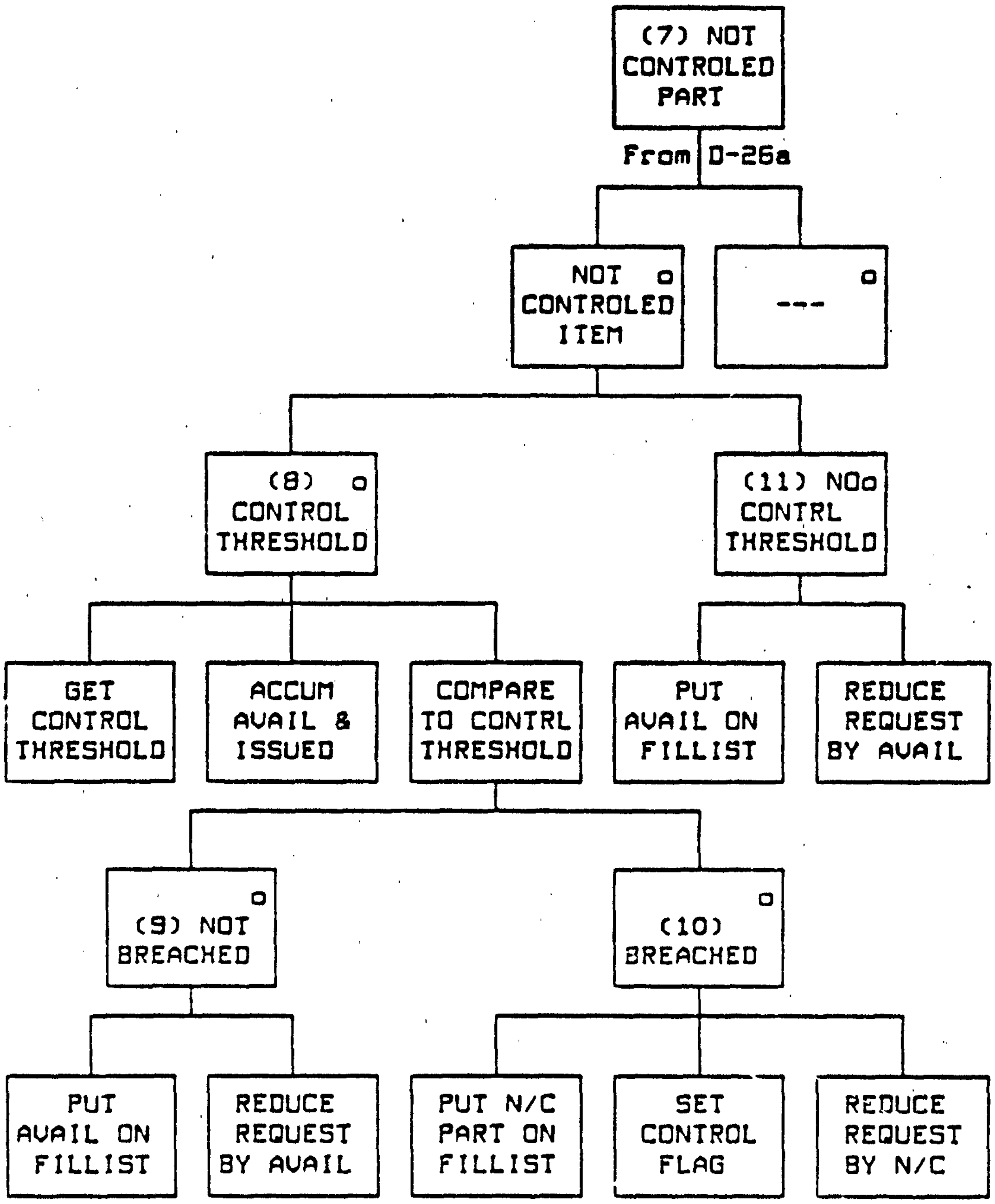

Figure D-26b. F-SUPPLY-RQST generator (continued)

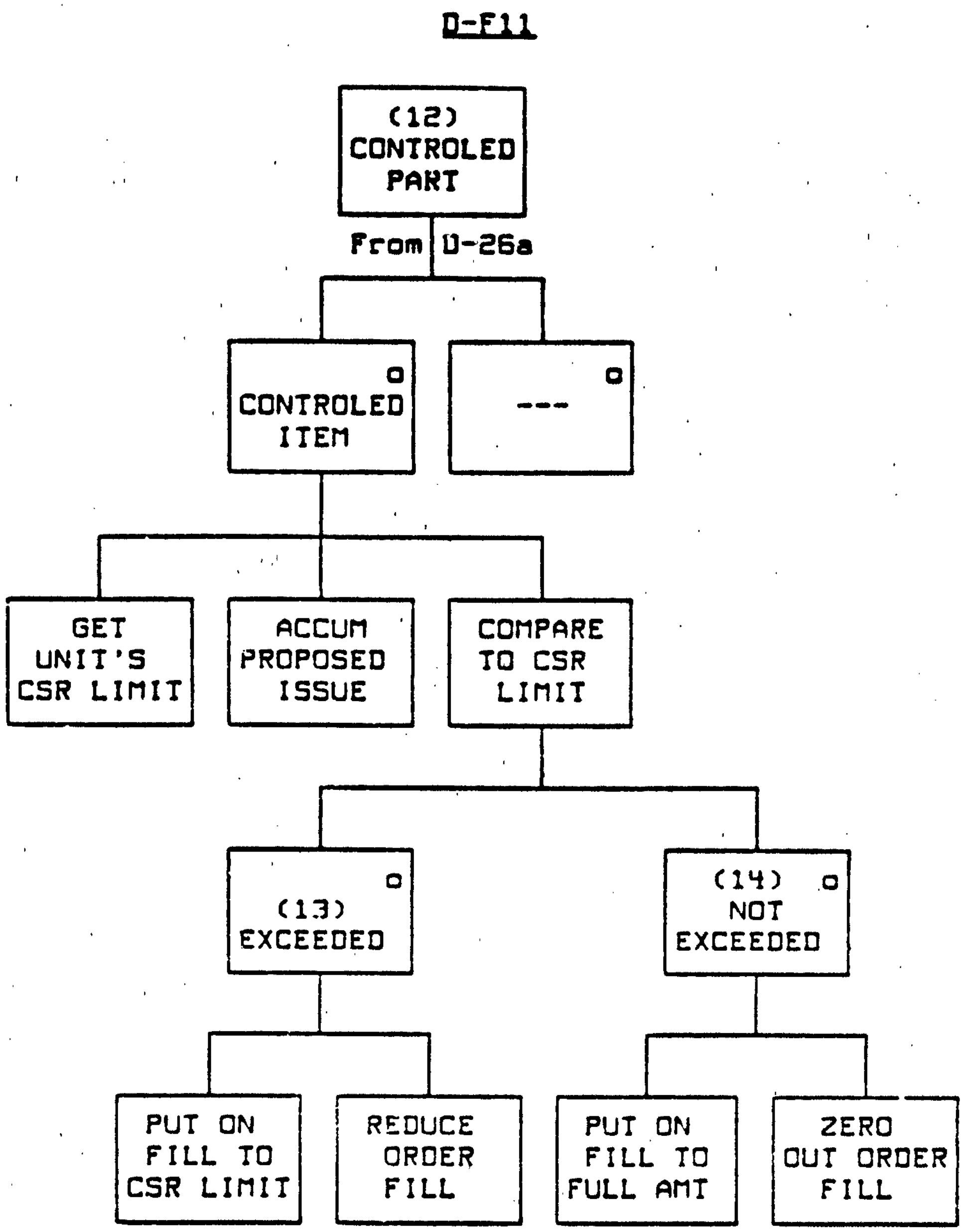

Figure D-26c. F-SUPPLY-RQST generator (continued)

D-F11

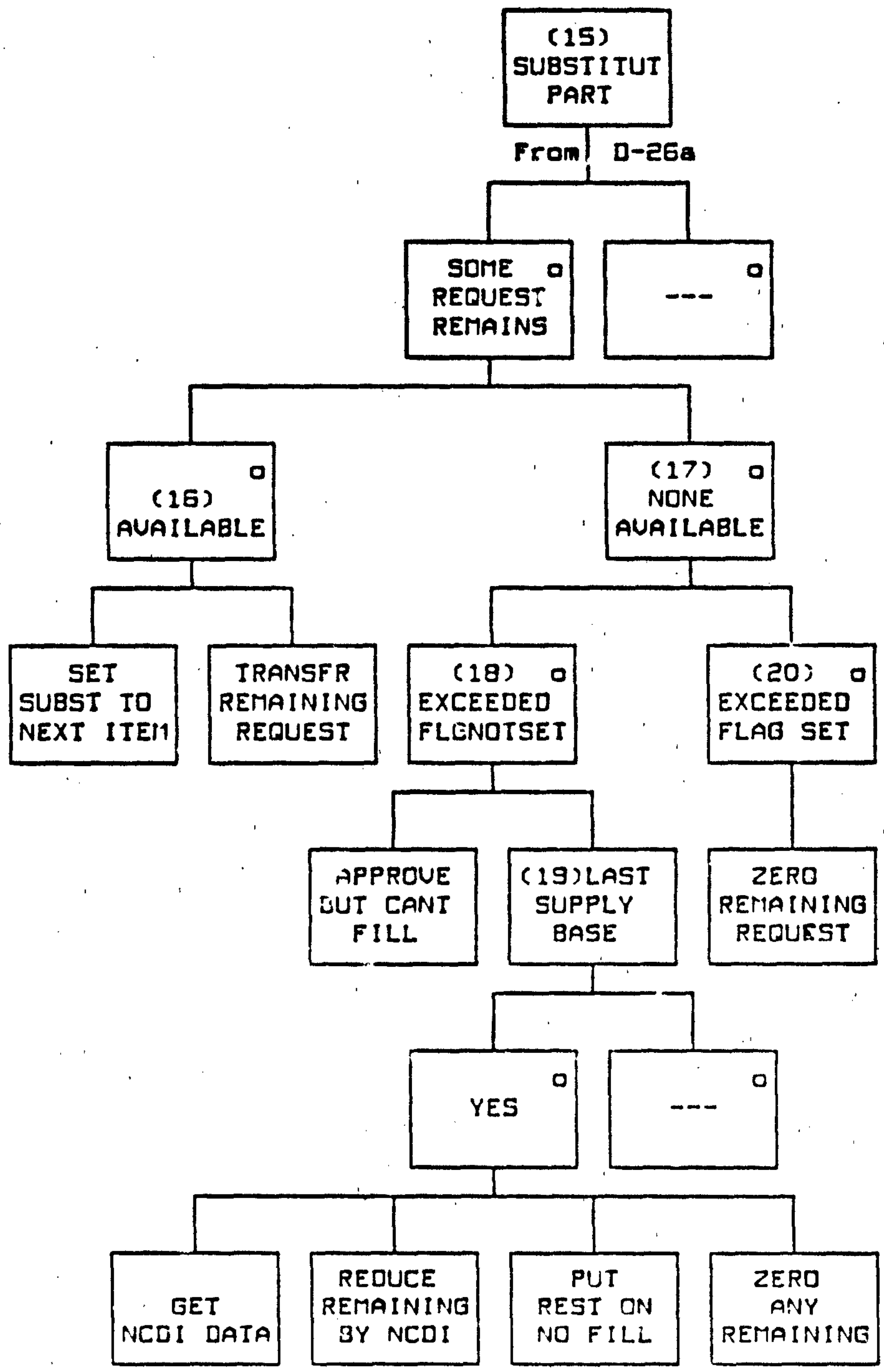

Figure D-26d. F-SUPPLY-RQST generator (continued)

GENERATOR DESCRIPTION: F-SUPPLY-RQST

1. RECEIVE PROMPT. Read input parameters (D1).

2. SUPPLY ITEMS REQUESTED. Loop through the supply items requested (D1).

3. UNTIL ALL TREATED. Loop through the fill process until all of each supply item is filled, substituted for, listed as no-fill, or deleted (disapproved).

4. AVAILABLE. Check the SUPPLIER for noncommitted amounts of the supply item available (S2). (Note: Portions of the supply base's on-hand quantities of supplies may be committed to supply ALLOCATIONs (reservations.) Note, also, that the effect of contamination on a unit's on-hand supplies (committed or noncommitted, including ALLOCATIONs) of a supply type should be determined and accounted for by the contaminating module at the time of the contamination. This will require a special utility routine, developed by the implementors, that can be called at the time of occurrence.) If a supply base is in the process of relocating, see the movement flag (S2), it has an adverse affect on the availability of supplies. This affect is represented by the product of a fraction (data input), dependent on supply base SRC, echelon, supply type, etc., times the quantity of noncommitted supplies on-hand.

5. SOME AVAILABLE. If some are available, go on to check the control status.

6. NONE AVAILABLE. If none are available, keep the supply item on the request list until substitutes can be checked.

7. NOT CONTROLLED. If the supply item is not controlled (NCSI) and the control flag is not set, get the control threshold and the issued-so-far-today amounts. Accumulate the issues and the minimum of the requested amounts and the amount on-hand.

8. CONTROL THRESHOLD. Compare the above result against the control threshold.

9. NOT BREACHED. If the NCSI did not breach the control threshold, put the entire amount of the request on the approved list (on a FIFO basis) and zero the request.

10. BREACHED. If the NCSI breached the threshold, set the control flag and put the amount less than the threshold on the approved list. Remove the fill amount from the request (S2).

D-F11

F-SUPPLY-RQST (cont.)

11. NO CONTROL THRESHOLD. If the item has no control threshold, put any amount requested and available (noncommitted) on the approved list. Remove the amount filled from the request list.

12. CONTROLLED. If the supply item's controlled flag is set, accumulate the issued and the minimum of the requested amounts and the amount on-hand. Compare the result against the SUPPLY-CUSTOMER's controlled allotment (CA) for the item for today (53).

13. EXCEEDED. If the sum exceeds the CA for the item, fill up to the CA limit, remove the amount from the request, and set the exceeded flag.

14. NOT EXCEEDED. If not exceeded, fill the entire amount and reduce the requested amount for the supply item by the amount filled.

15. SUBSTITUTES. If any of the supply item request remains unfilled because of lack of availability or exceeded controlled allotment, check for an assigned substitute (D4/S5).

16. AVAILABLE. If one exists, set it to be the next item to be checked and transfer over the remaining, unfilled, request amount.

17. NONE AVAILABLE. If no substitute exists, check the exceeded flag.

18. EXCEEDED FLAG NOT SET. If the flag is not set, check if this is **the last supply base.**

19. LAST SUPPLY BASE. If it is the last supply base, reduce the remaining request by the amount of the NCDI for the item, put any remaining on the no-fill list, and zero out the remaining amount.

20. EXCEEDED FLAG SET. If the exceeded flag is set, zero out the remaining requested amount.

21. RETURN. Once the request list is treated, pass any resultant fill list and/or no-fill list back to the invoking routine (D6).

D-F12

D-F12 F-ARRIVE-SUPPLIER TYPE: Interactive Function

SUMMARY: This function is prompted by the arrival of a transport unit (TU) at a supply base. The TU is delivering a supply request for a SUPPLY-CUSTOMER (D-E1, user unit or supply base) needing the supplies. The TU is first assessed to see if it was interdicted enroute. If so, F-TU-LOSSES (D-F13) is called to adjust the supply request to the amount of supplies it can now carry. Then the type of order (ALLOCATION or non-ALLOCATION) that the TU is there to pick up is determined. If it is an ALLOCATION, F-ALLOC-ORDER (D-F14) is called to handle the previously validated and reserved orders. If it is a non-ALLOCATION order, F-SUPPLY-ROST (D-F11) is called. If the supply base cannot fill part of the order, F-TU-DECISION (D-F15) is invoked so the TU commander can make a decision on what to do and the supply base commander can respond with the appropriate action regarding the supply order. If the decision is to load the fill list, F-LIFT-JOB (D-F16) is invoked.

TRIGGERED BY:	F-ATOBJ-GRND	(C-F10)	Transportation
	F-ATOBJ-AIR	(C-F11)	Transportation

RESULTING IN:	F-TU-LOSSES	(D-F13)
	F-ALLOC-ORDER	(D-F14)
	F-SUPPLY-ROST	(D-F11)
	F-TU-DECISION	(D-F15)
	F-LIFT-JOB	(D-F16)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-27.

<u>D-F12</u>

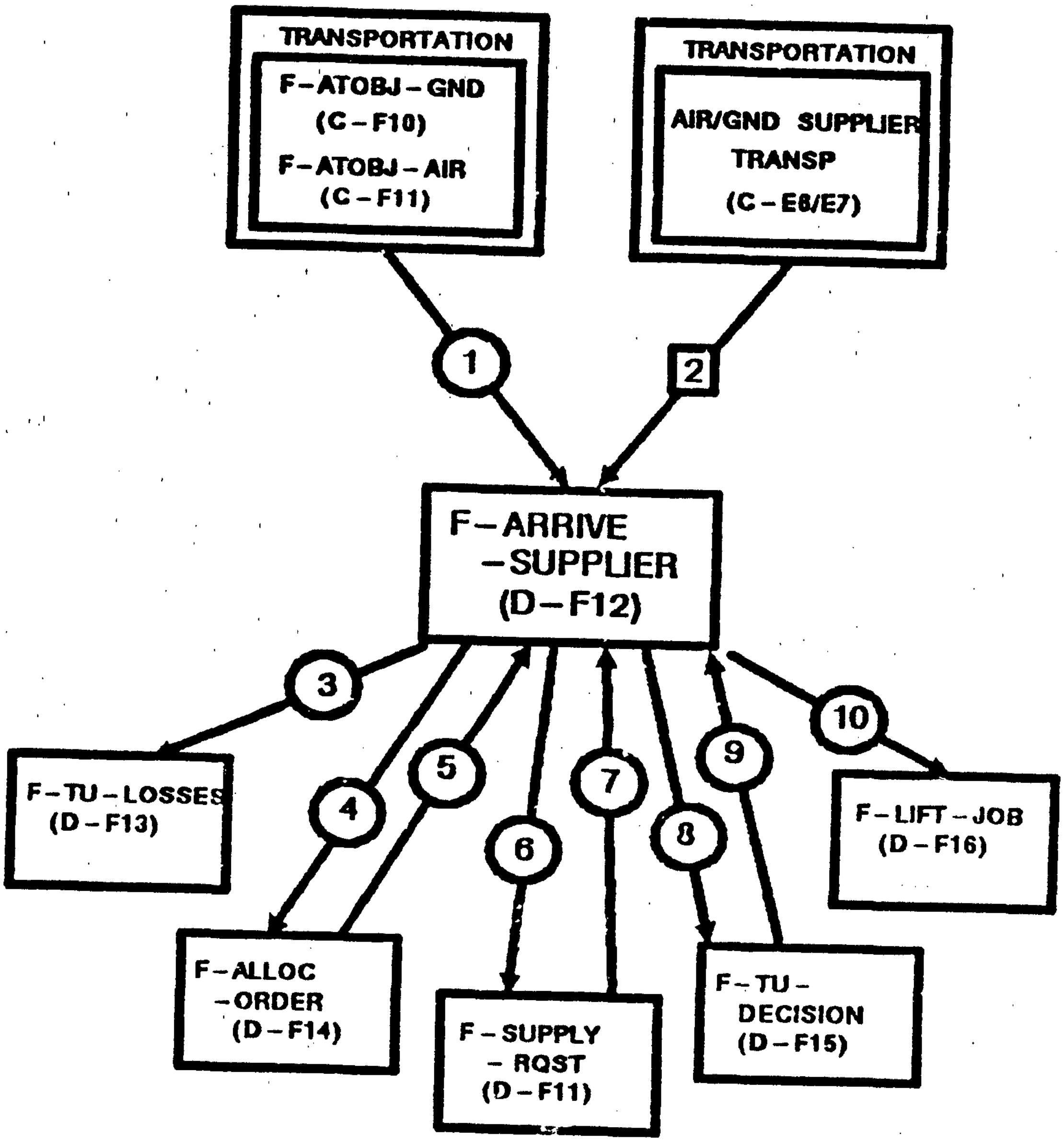

FIGURE D-27. F-ARRIVE-SUPPLIER SSD

DATA DEFINITION: F-ARRIVE-SUPPLIER

Connection Number	Data Transferred	Comments
D1	Prompt received from arriving TU:	
	o TU ID	
D2	Information required from the TU:	
	o SUPPLY-CUSTOMER ID	Unit needing supplies.
	o SUPPLIER ID	Current location.
	o Order type	Regular, emergency, ALLOCATION.
	o System effectiveness	Used to determine if interdicted enroute.
D3	Parameters passed to F-TU-LOSSES (D-F13):	
	o TU ID	If interdicted enroute, sets TU vehicles to the number surviving and reduces the order by the amount of lost carrying capacity.
D4	Parameters sent to F-ALLOC-ORDER (D-F14):	
	o TU ID	Contains the surviving ALLOCATION order.
D5	Parameters returned from F-ALLOC-ORDER (D-F14):	
	o ALLOCATION ID	
	o Fill list	(Suppl. ID, item#, quantity)*, available.
	o No fill list	(Supply ID, item#, quantity)*, not currently available.
D6	Parameters sent to F-SUPPLY-RQST (D-F11) about order:	
	o SUPPLY-CUSTOMER ID	Unit making request.
	o SUPPLIER ID	Unit filling request.
	o Supply request	(Supply ID, item#, quantity)*.

DATA DEFINITION: F-ARRIVE-SUPPLIER (cont.)

Connection Number	Data Transferred	Comments
D7	Parameters returned from F-SUPPLY-RQST (D-F11):	
	o Fill list	(Supply ID, item#, quantity)*, available.
	o No fill list	(Supply ID, item#, quantity)*, not currently available.
D8	Information passed to F-TU-DECISION (D-F15).	
	o TU ID	
	o Last SUPPLIER flag	0 - other; 1 - last.
	o Fill list	(Supply ID, item#, quantity)*.
	o No fill list	(Supply ID, item#, quantity)*.
D9	Information returned from F-TU-DECISION:	
	o Fill list	Could be zero for some decisions which would indicate no lift requirement at this time.
D10	Information passed to F-LIFT-JOB (D-F1[illegible]).	
	o SUPPLY-CUSTOMER ID	
	o SUPPLIER ID	
	o TU ID	
	o Fill list	(Supply ID, item#, quantity)*.

D-F12

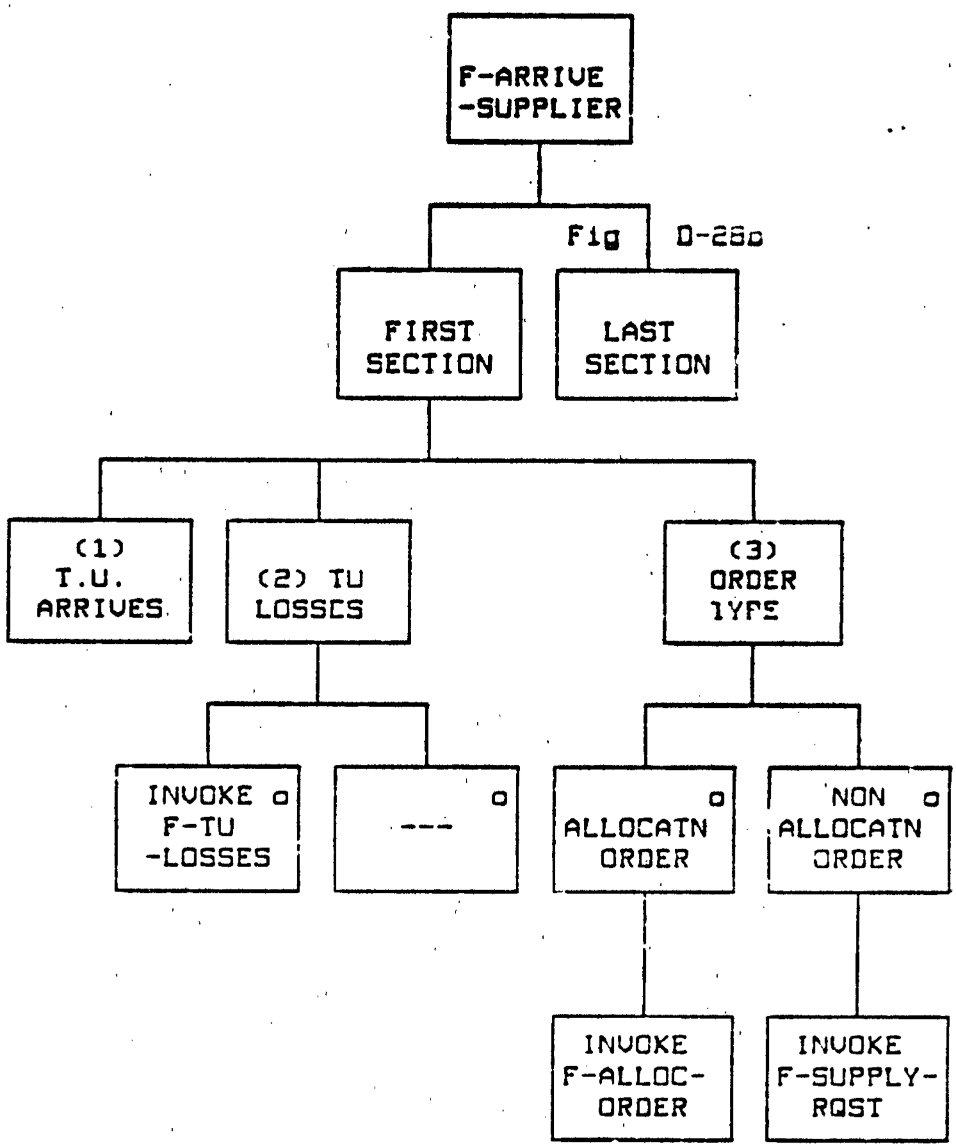

Figure D-28a. F-ARRIVE-SUPPLIER generator

D-E12

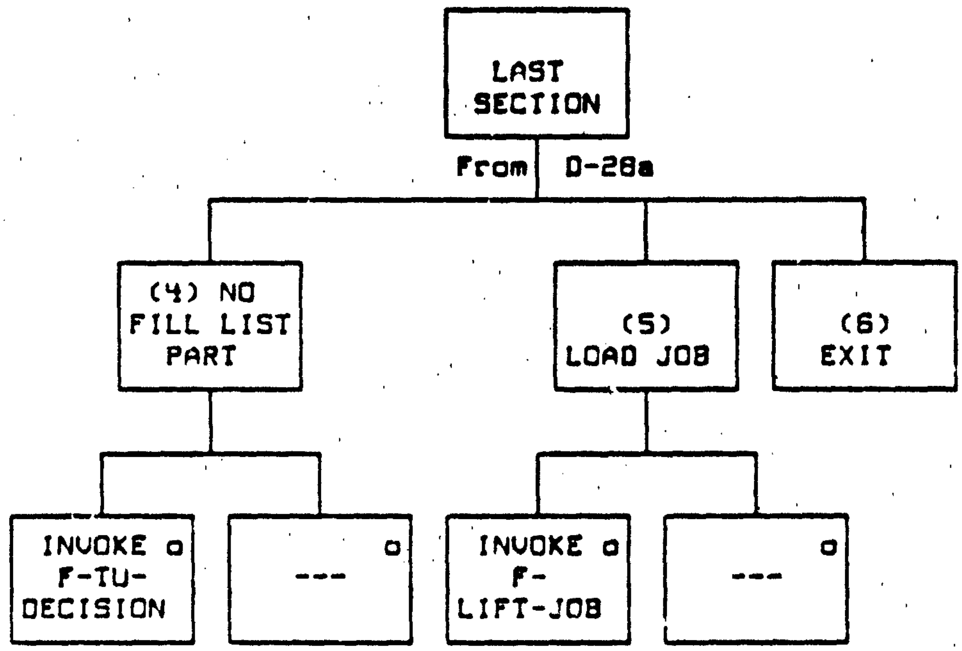

Figure D-28b. F-ARRIVE-SUPPLIER generator (continued)

D-F12

GENERATOR DESCRIPTION: F-ARRIVE-SUPPLIER

1. TU ARRIVES. Get the TU's ID (D1). Ascertain the TU status (S2).

2. TU LOSSES. If the system effectiveness < 1.0, then interdiction of the TU occurred enroute, so call F-TU-LOSSES (D3: D-F13) to adjust the TU cargo vehicles authorized and the order amount. If the TU is contaminated (NBC), invoke F-DECON-DECIDE. (Note: A utility routine should be developed for determining the effect of the various contaminates on the various supply types and subtracting out any "undecontaminable" supplies (i.e. possibly food). This routine should be called by the decon module, probably at the end of the decon process.)

3. ORDER TYPE. Check the order type (S2) to see if it is for an ALLOCATION (D-E3) pickup or for another order type. If an ALLOCATION order, invoke F-ALLOC-ORDER (D4: D-F14). The function returns the information listed in D5. If any other type of order, invoke F-SUPPLY-RQST (D6: D-F11). The function returns the information listed in D7.

4. FILL/NO-FILL LISTS. If a no-fill list is returned, invoke F-TU-DECISION (D8: D-F15) to get decision from TU commander on what to do about it. The no-fill list is either dropped or queued, depending on the TU decison. The fill list is returned (D9) to indicate if any is to be loaded. If zero, no loading is required at this time.

5. JOB PART. If a load requirement (fill list) were returned and the TU commander did not decide to do something else, invoke F-LIFT-JOB (D10: D-F16).

6. EXIT. Leave the Supply Module.

D-F13 F-TU-LOSSES TYPE: Interactive Function

SUMMARY: This function finds the number of TU cargo vehicles interdicted enroute and the amount of the carrying capacity or supply order lost. It triggers the action (A-LOSE-ORDER) that revises the SUPPLY-CUSTOMER due-in and TU vehicles authorized to the current number of vehicles on-hand. If appropriate, this function initiates a new order for the receiving unit to replace the part of the order lost, which may still be needed but can no longer be expected.

TRIGGERED BY:	F-ARRIVE-SUPPLIER	(D-F12)
	F-ARRIVE-CUSTOMER	(D-F17)

RESULTING IN:	SUPPLY-CUSTOMER	(D-E2)	
	A-LOSE-ORDER	(D-A12)	
	F-CREATE-TASK	(C-F1)	Transportation
	F-RQ-RQMT	(D-F1)	

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-29.

D-F13

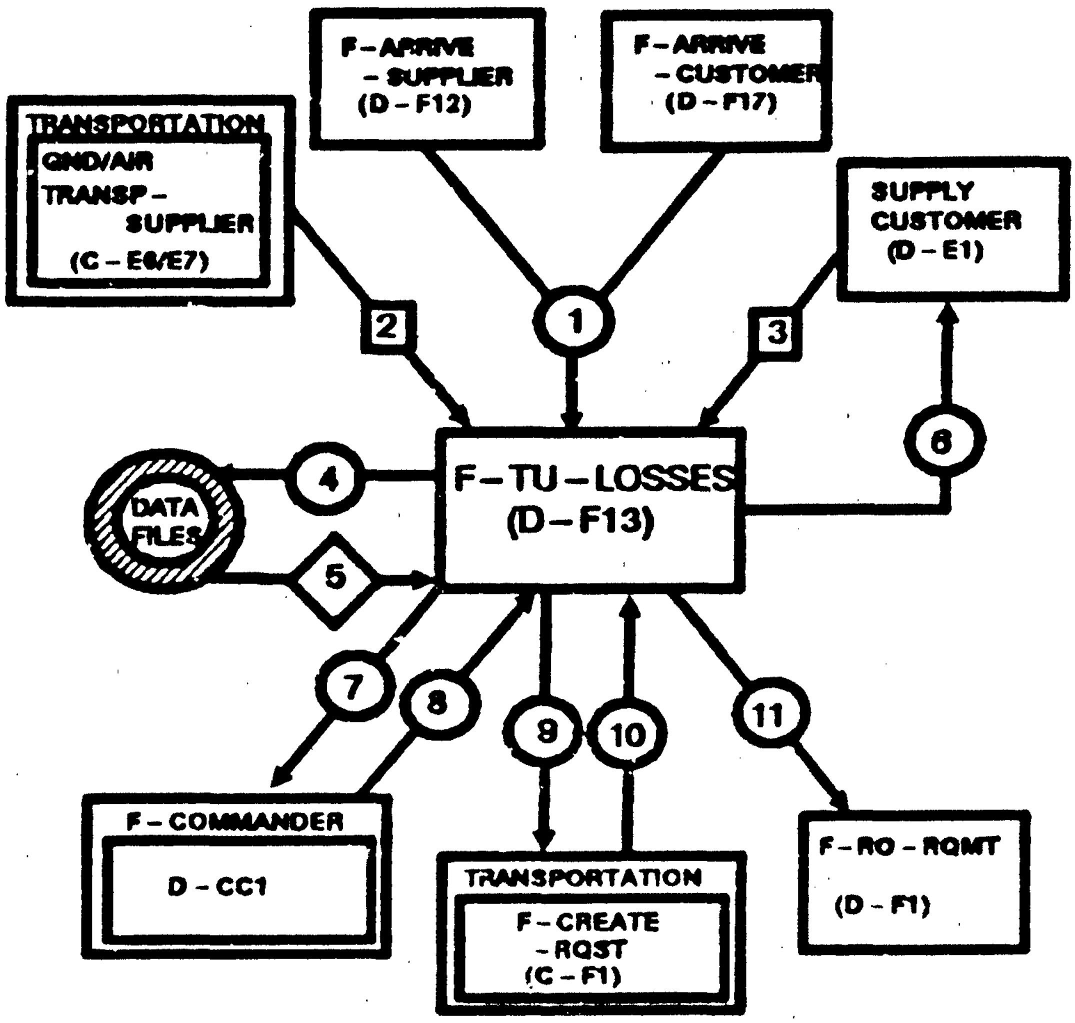

FIGURE D-29. F-TU-LOSSES SSD

D-F13

DATA DEFINITION: F-TU-LOSSES

Connection Number	Data Transferred	Comments
D1	Parameters received from invoking function:	
	o TU ID	The arriving interdicted transport unit (TU).
S2	Information from the TU state vector:	
	o SUPPLY-CUSTOMER ID	Unit needing the supplies.
	o SUPPLIER ID	In case a new order is needed.
	o TU vehicle list	(System#, quantity #, authorized and surviving.
	o Order list	(Supply ID, item#, quantity)#, ordered.
	o Order type	Normal, emergency or ALLOCATION.
S3	Information from the SUPPLY-CUSTOMER state vector:	
	o Mission	
	o Supply indicator	
D4	Parameter to access data file of carrying capacity:	
	o System ID	
S5	Data file of carrying capacity of cargo vehicles (D-DF3):	
	o Carrying capacity	Per cargo vehicle.
D6	Trigger A-LOSE-ORDER (D-A12) to revise the SUPPLY-CUSTOMER due-in and the TU status:	
	o SUPPLY-CUSTOMER ID	
	o TU ID	Arriving interdicted TU.
	o Order data	(Supply ID, item#, quantity)#, lost.
	o System list	(System#, quantity)#, lost list.

D-F13

DATA DEFINITION: F-TU-LOSSES (cont.)

Connection Number	Data Transferred	Comments
D7	**Sent to F-COMMANDER for decision on reorder (D-CC1):**	
	o Unit mission	
	o Supply indicator	
	o Request type	(normal, emergency, ALLOCATION)
	o Supply type	
	o Fraction of order lost	
D8	Returned from F-COMMANDER:	
	o Decision	0 - no order; 1 - place order for amount lost.
D9	Information needed to submit a makeup order to transportation, F-CREATE-RQST (C-F4):	
	o Initial unit ID	Blue=SUPPLY-CUSTOMER; Red=SUPPLIER.
	o Destination ID	Blue=SUPPLIER; Red=SUPPLY-CUSTOMER.
	o Order list	(Supply ID, item#, quantity)*, lost.
	o Request type	Normal, emergency, or ALLOCATION.
D10	Response from transportation:	
	o Request flag	0 = request not created. 1 = request created.
D11	Information needed to invoke F-RO-RQMT (D-F1) to recheck the SUPPLY-CUSTOMER (D-E1) for the supply type lost:	
	o Support flag	Set = 0 for single unit.
	o SUPPLY-CUSTOMER ID	Unit to have supply type rechecked.
	o Supply type	

D-F13

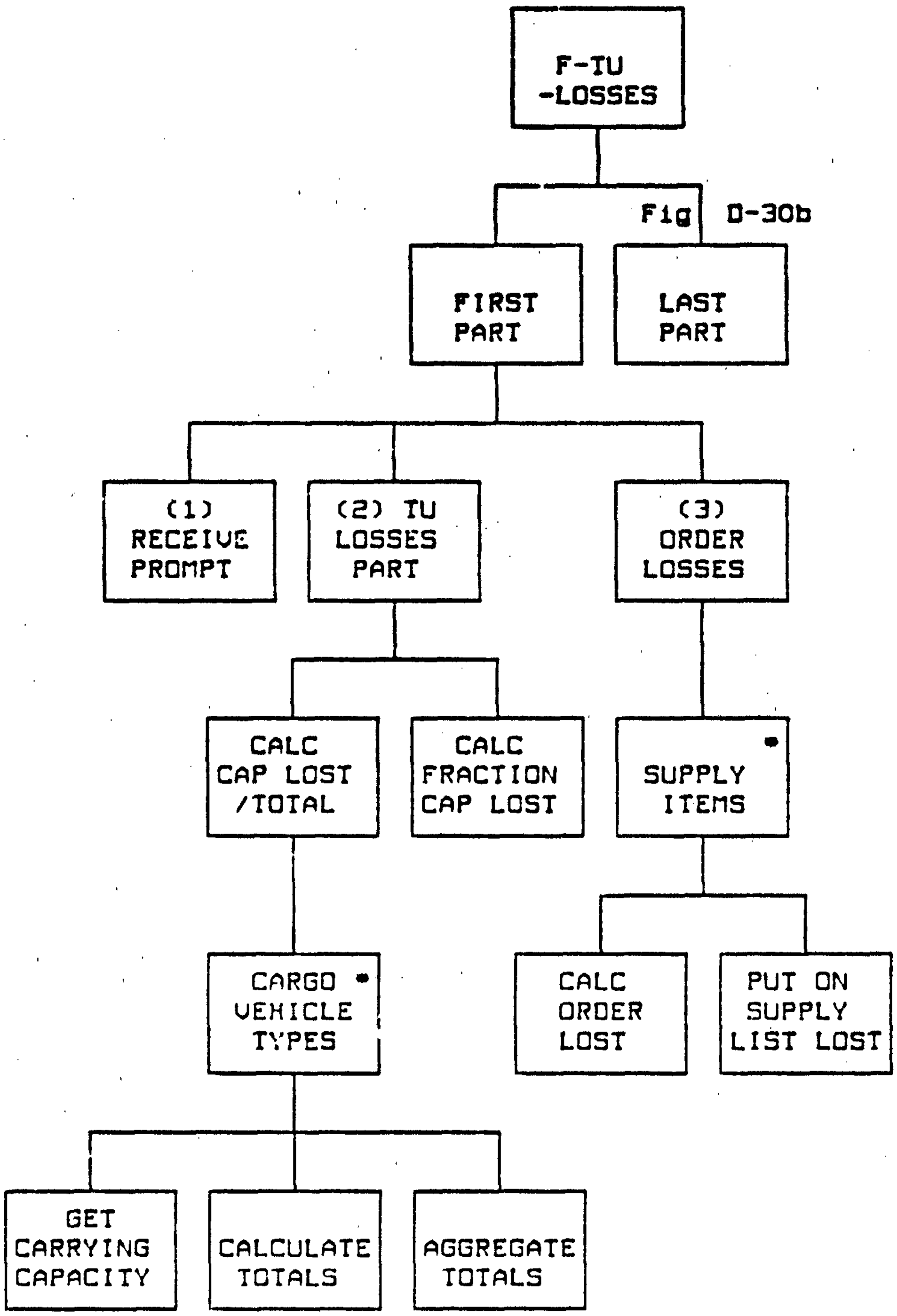

Figure D-30a. F-TU-LOSSES generator

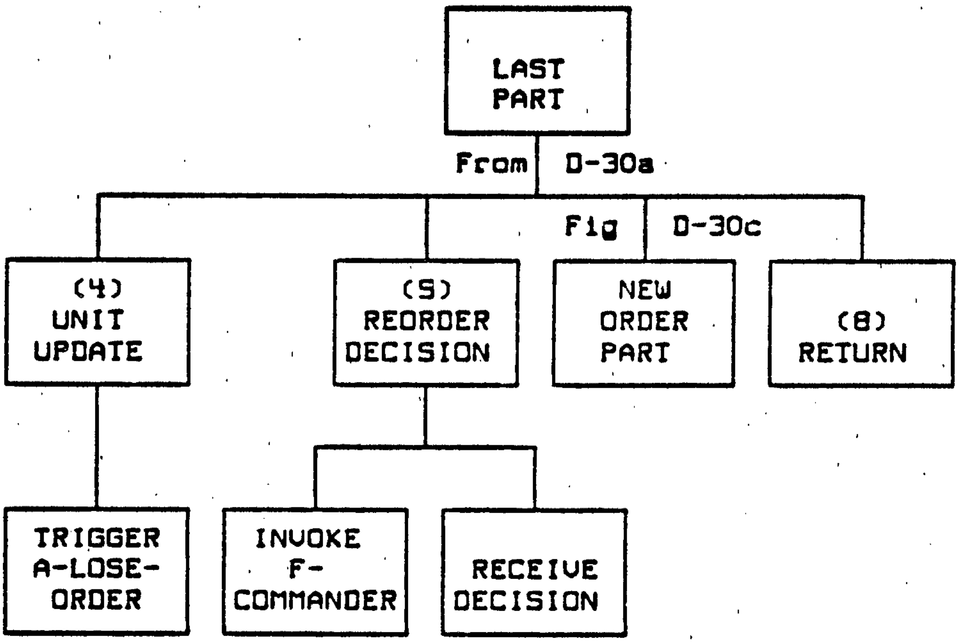

Figure D-30b. F-TU-LOSSES generator (continued)

D-F13

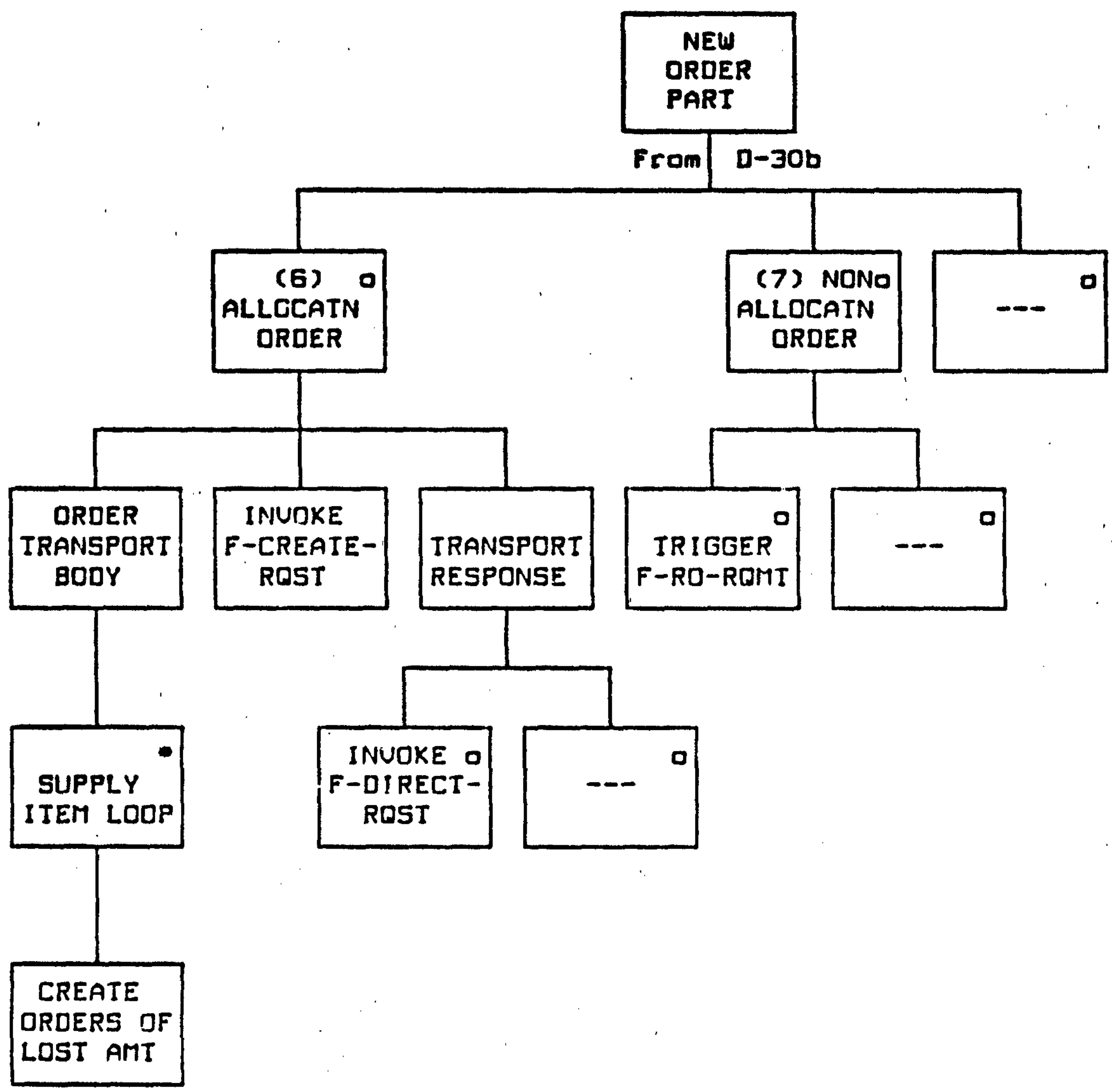

Figure D-30c. F-TU-LOSSES generator (continued)

GENERATOR DESCRIPTION: F-TU-LOSSES

1. RECEIVE PROMPT. Read D1. Get information from TU (S2).

2. TU LOSSES. It is desireable at this point to set the authorized vehicles on the TU to the number on-hand before it departs for its next destination. The reason is so the fraction interdicted enroute to its next destination can be easily determined for use in reducing the supply order. Begin looping through the cargo vehicle types on the TU finding the differance in the current quantity on-hand and authorized. Put the system ID and quantity lost onto a list for later use in paragraph 4, UNIT UPDATES. Get the carrying capacity of each vehicle type from the data file(S4/D5) and multiply it times the number of the vehicle type lost and times the number authorized. Aggregate the two amounts into running totals, one for carrying capacity lost and one for carrying capacity authorized, to be used after cycling through vehicle types to determine the fraction of total carrying capacity lost by the TU.

3. ORDER LOSSES. Loop through the list of supply items on the original order to create a list of the supply order losses. Determine the quantity of each supply item lost by multiplying the authorized quantity times the fraction of TU vehicles lost (from paragraph 2). Create a list of supply items and quantities lost.

4. UNIT UPDATES. Before considering sending another order, it is necessary to update the SUPPLY-CUSTOMER's due-in and the TU cargo vehicle status, so that the decision is not interfered with. Trigger A-LOSE-ORDER to update the CUSTOMER's due-in data and the TU's cargo vehicle data (D6).

5. REORDER DECISION. Send request to F-COMMANDER for decision on whether the lost order should be reordered at this time (D7). Receive the decision (D8). If the decision is yes, place the reorder: else, return to the invoking function.

6. ALLOCATION ORDER. If the order type were an ALLOCATION (S2), submit the lost order to transportation (D9: F-CREATE-RQST, C-F1). If the request were created (D10), invoke F-DIRECT-RQST (C-F2).

7. NON ALLOCATION ORDER. If not an ALLOCATION order and if a RO supply type, trigger F-RO-RQMT (D11: D-F1) to check on the need to create a new order for the SUPPLY-CUSTOMER. Otherwise, do not create an order until the regular time.

8. RETURN. No information is returned to the invoking function. The status of both the SUPPLY-CUSTOMER and the TU were updated and any required supply makeup orders were submitted for transportation support.

D-F14

DF-14 F-ALLOC-ORDER TYPE: Interactive Function

SUMMARY: This function simulates a SUPPLIER receiving the pickup order of an ALLOCATION from an arriving transport unit (TU) for a SUPPLY-CUSTOMER. The ALLOCATION is already created and, barring interdiction of the TU or supply base, lack of transportation, etc., the supplies available in the ALLOCATION should match the TU's order. However, differences are checked for. If any exist, the order is revised into fill and no-fill lists which are returned to F-ARRIVE-SUPPLIER.

TRIGGERED BY: F-ARRIVE-SUPPLIER (D-F12)

RESULTING IN: Fill and no-fill lists of committed supplies in the SUPPLY-CUSTOMER's allocated order.

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-31.

D-F14

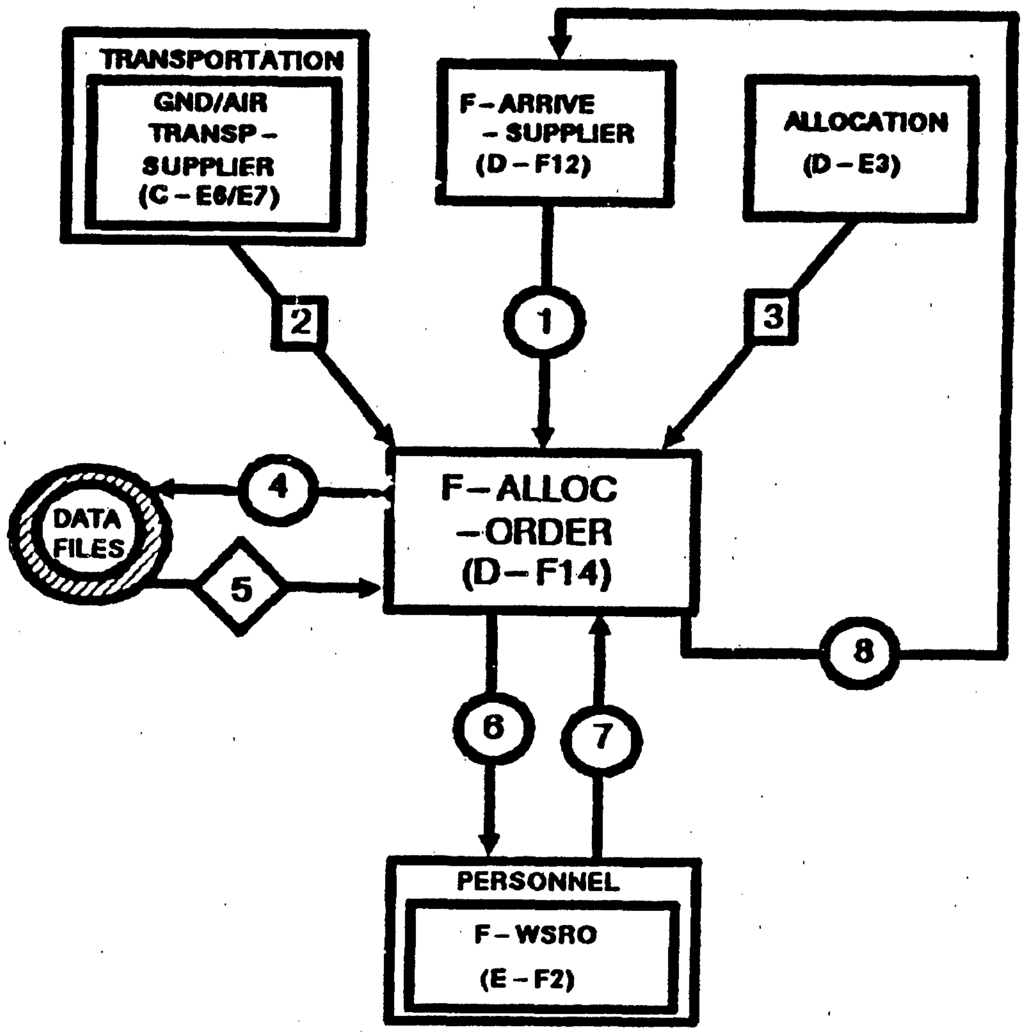

FIGURE D-31. F-ALLOC-ORDER SSD

D-F14

DATA DEFINITION: F-ALLOC-ORDER

Connection Number	Data Transferred	Comments
D1	Prompt from invoking F-ARRIVE-SUPPLIER (D-F12):	
	o TU ID	
S2	Information needed from TU about the ALLOCATION order:	
	o ALLOCATION ID	
	o Order list	(Supply type, item#, quantity)*.
S3	Information about the ALLOCATION (D-E3) status:	
	o ALLOCATION list	(Supply type, item#, quantity)*, committed.
D4	Parameter needed to access data file at S5:	
	o MEI ID	
S5	Data file (D-DF11) on each MEI:	
	o Basic load	(Supply ID, item#, quantity)*.
D6	Parameters passed to Personnel (F-WSRO; F-EI):	
	o TU ID	Personnel = CUSTOMER.
	o Unit ID	MEI SUPPLY-CUSTOMER.
	o ALLOCATION ID	Used to identify the personnel request.
	o MEI order list	(System#, quantity)*.
D7	Parameters returned from personnel module:	
	o Crew list	(System#, crews)*, available. A flag value to indicate if crews not required for WSRO MEI.
D9	Information returned to F-ARRIVE-SUPPLIER (D-F12):	
	o ALLOCATION ID	
	o Fill list	
	o No-fill list	

D-F14

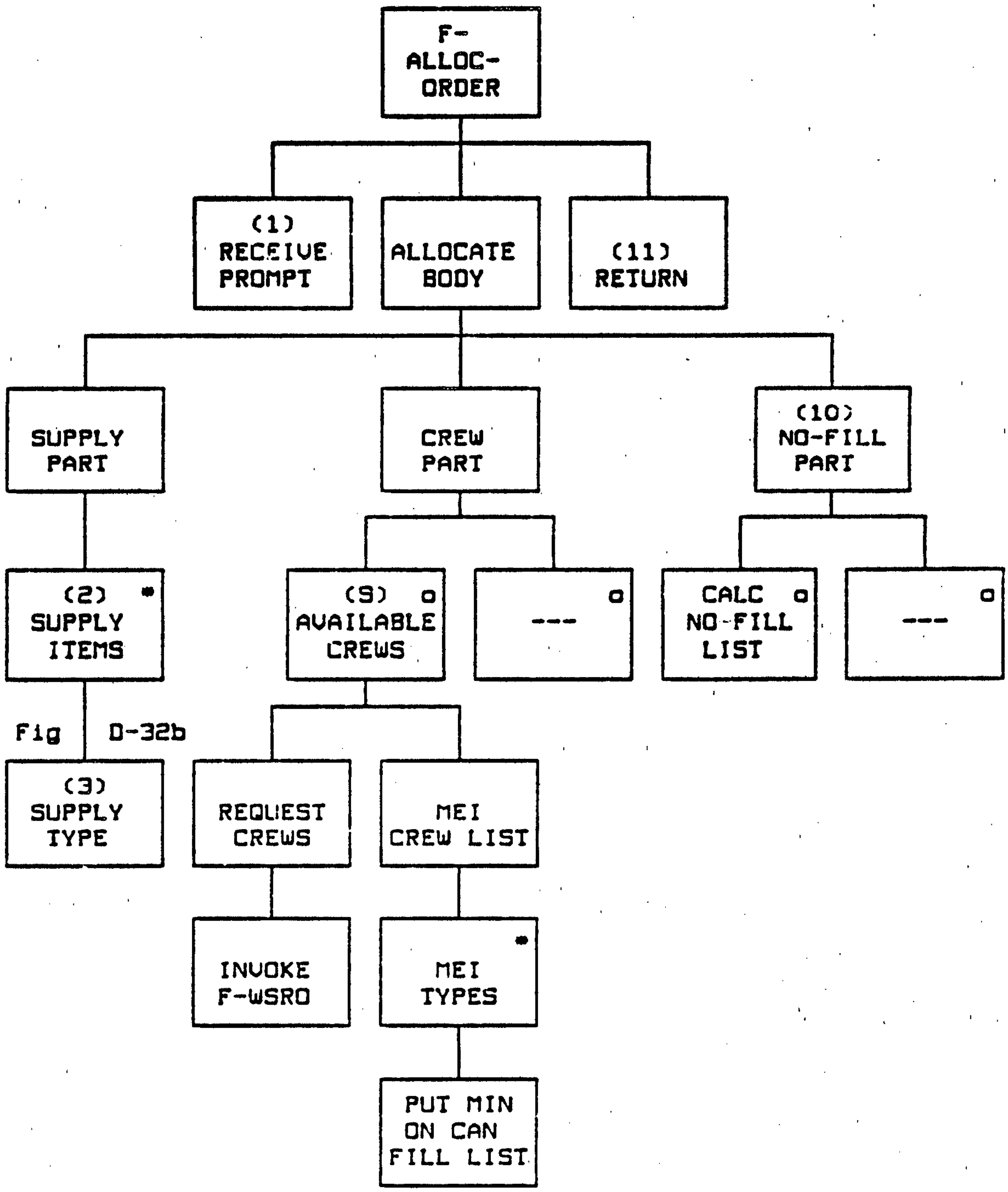

Figure D-32a. F-ALLOC-ORDER generator

D-F14

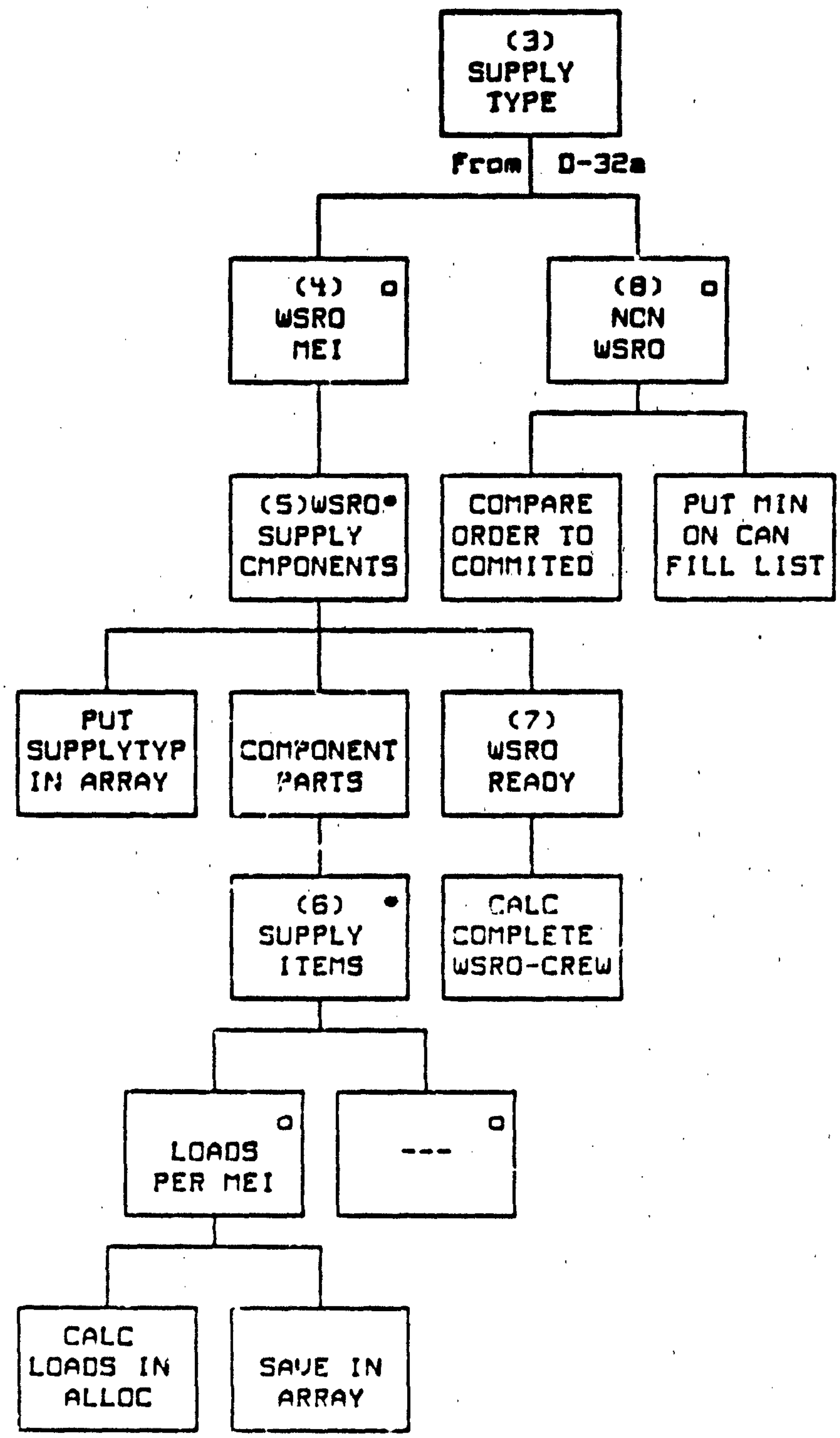

Figure D-32b. F-ALLOC-ORDER generator (continued)

GENERATOR DESCRIPTION: F-ALLOC-ORDER

1. RECEIVE PROMPT. Get TU ID at D1. Get TU order information (S2). Get data on supplies committed to ALLOCATION (S3). (Note: The supplies remain in the assets of the supply base but are listed as committed to an ALLOCATION. They are listed in the ALLOCATION as available at the SUPPLIER. These amounts may change over time as a result of interdiction, contamination, supply arrivals, etc. A utility routine must be developed for impacting the ALLOCATION supplies availablity when contaminated or interdicted.)

2. SUPPLY ITEMS. Begin cycling through the items in the ALLOCATION order list at S2.

3. SUPPLY TYPE. Check for WSRO MEI versus other supply types (S2).

4. WSRO MEIs. If the ALLOCATION were for WSRO MEI, cycle through the component (ammunition or fuel) supply types allocated to the order. (Note: There may not be any component supply types for the WSRO MEI type, so no iteration through the loop is necessary.)

5. WSRO SUPPLY COMPONENTS. If it does require any component supply types, load the list of supply items and their amounts in the basic load (D4/S5) of the MEI and the type and amounts committed to the ALLOCATION (S3) into local work arrays.

6. WSRO SUPPLY ITEMS. Cycle through the list of items in the MEI basic load (S5). (Note: It is assumed that the MEI are loaded into each unit type (SRC) by priority, and each ammunition type is loaded for each system by priority). Divide the amount of the item type committed (S3) by the amount of the item type in the MEI type's basic load (S4). This produces the total number of loads of the supply item for the MEI type. Take the minimum of the number of loads and the number of the MEI type and save it in a temporary array until all of the items of the supply type for the MEI are similarly treated. Once through all of the item types, take the minimum of all of the number of loads to determine the current number of that MEI type that is loaded with the supply type. Save this amount for use in paragraph 7, WSRO READY, for finding how many complete WSRU systems are available for shipment. Continue cycling through the component supply until done.

7. WSRO READY. Determine the number of the WSRO MEI completed by finding the minimum number of MEI, crews, component supply type loads. Place the MEI system and quantity on the fill list to be checked against the crews available. Reduce the quantity of component supplies available in the work arrays by the amount alloted to the MEI, so those used are not available to the remaining WSRO MEI being checked. Continue cycling through the WSRO MEI until all are treated.

F-ALLOC-ORDER (cont.)

8. NON-MEI. If the ALLOCATION were for other than WSRO MEI, put the minimum of the amount committed to the ALLOCATION and to the amount demanded in the order on the fill list for each item. If all of the order cannot be filled, put the difference on the no-fill list.

9. AVAILABLE CREWS. If a list of completed WSRO MEI results from the above algorithm, determine the number of crews available for the order by sending Personnel the list of MEI by invoke F-WSRO (D6). The number of crews available for each MEI type is returned (D7).

10. NO-FILL. If the number of WSRO systems ordered were greater than the number available, put the difference on the no-fill list. (Note: The fill list is not put on the TU nor the supplies taken out of the ALLOCATION until the TU commander has decided what to do about a no-fill list).

11. RETURN. The information at D8 is passed back to F-ARRIVE-SUPPLIER (D-F12).

D-F15 F-TU-DECISION TYPE: Interactive Function

SUMMARY: This function triggers F-SPLIT-CK (C-F13) to request a decision from the TU commander when there is a part of a supply request (no-fill list) that a supply base cannot fill. Once the TU commander reaches a decision, the supply base performs the necessary action(s) to the fill and no-fill lists in response to the decision. (The fill list is passed back to be filled or zeroed out. The no-fill list is either put on the backorder queue (BOQ) or zeroed out.)

TRIGGERED BY: F-ARRIVE-SUPPLIER (D-F12)

RESULTING IN: F-SPLIT-CK (C-F13) Transportation

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-33.

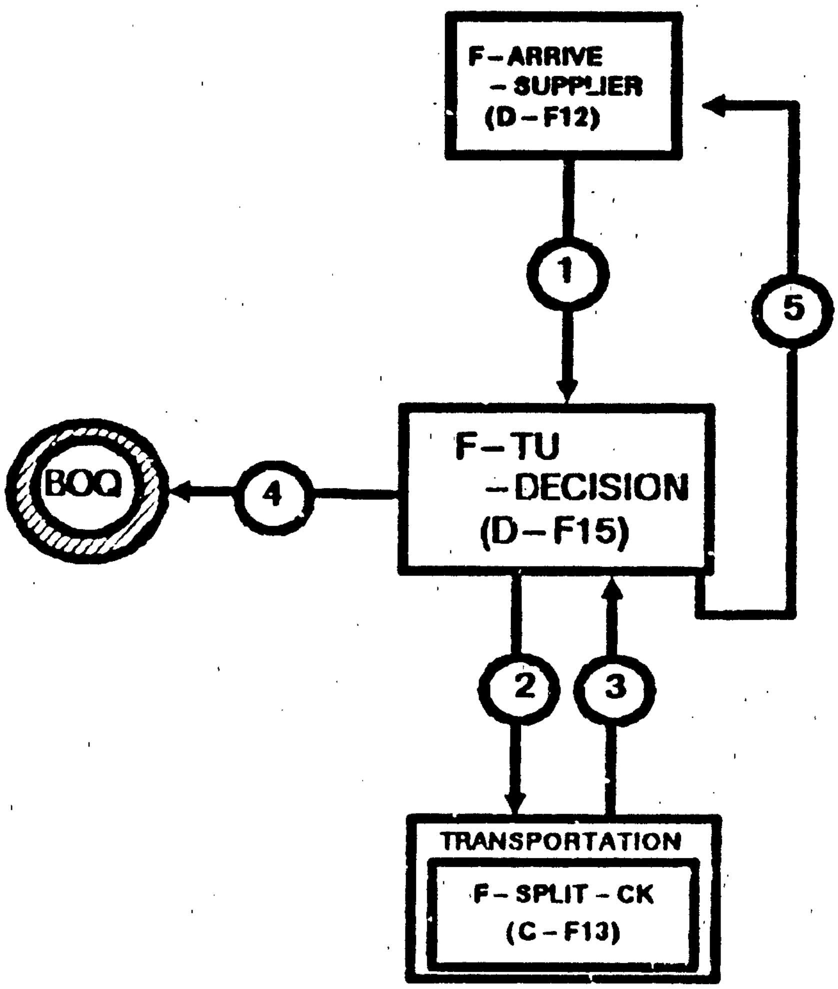

FIGURE D-33. F-TU-DECISION SSD

DATA DEFINITION: F-TU-DECISION

Connection Number	Data Transferred	Comments
D1	Information passed from F-ARRIVE-SUPPLIER (D-F12):	
	o TU ID	
	o LAST SUPPLIER FLAG	0 - another; 1 - last.
	o Fill list	(Supply ID, item#, quantity)*.
	o No-fill list	(Supply ID, item#, quantity)*.
D2	Parameters passed to F-SPLIT-CK (C-F13) for TU decision:	
	o TU ID	
	o No-fill list	(Supply ID, item#, quantity)*.
	o SUPPLIER flag	0 or next supply base ID.
D3	Decision returned from F-SPLIT-CK (C-F13):	
	o New TU ID	0 - If none created.
	o Decision code	1 - Load fill; drop no-fill list. 2 - Load fill; queue no-fill list. 3 - No load; drop both lists.
D4	Information put on BOQ:	
	o New TU ID	Decision 2 in D3.
	o No-fill list	
D5	Information returned to F-ARRIVE-SUPPLIER (D-F12):	
	o Fill list	Could be zeroed by decision 3 in D3.

D-F15

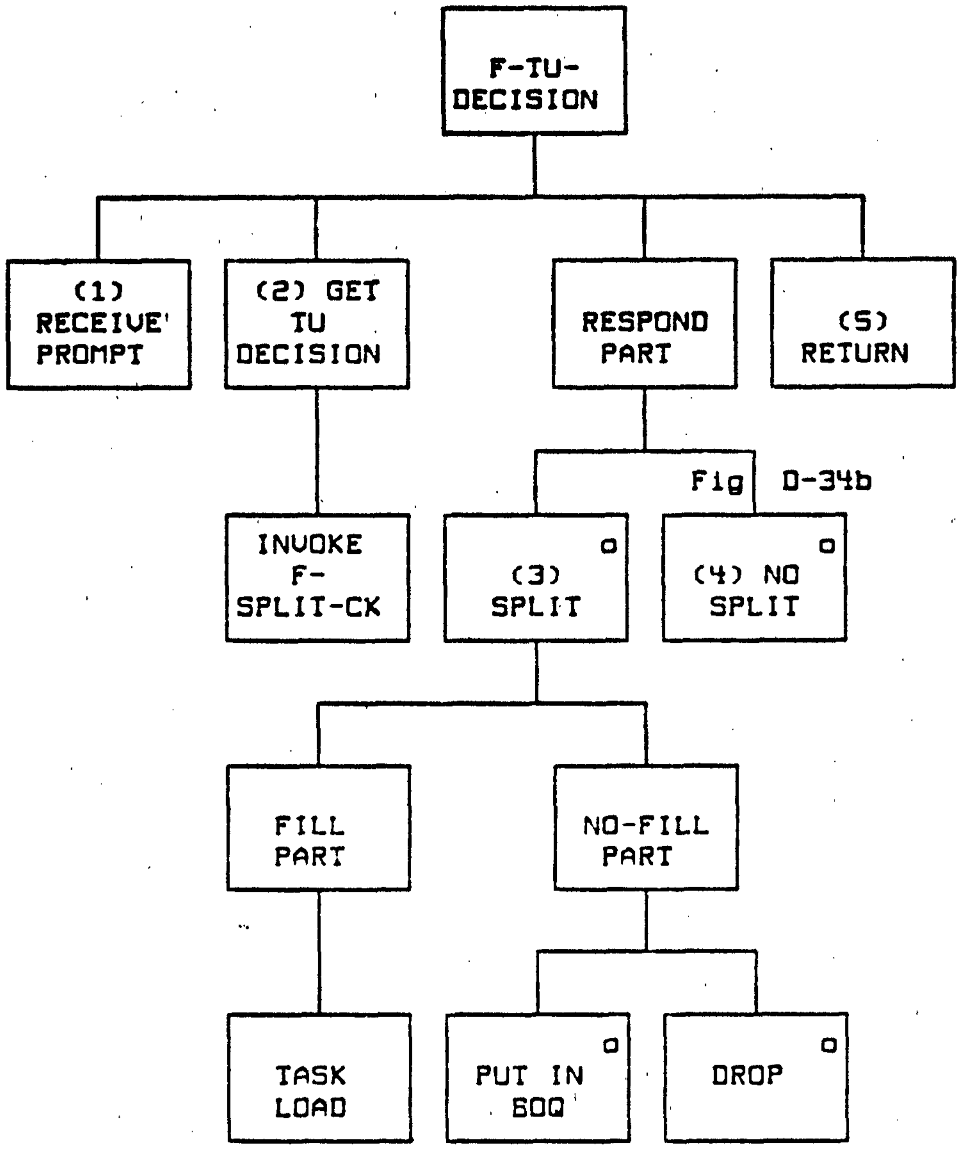

Figure D-34a. F-TU-DECISION generator

U-F15

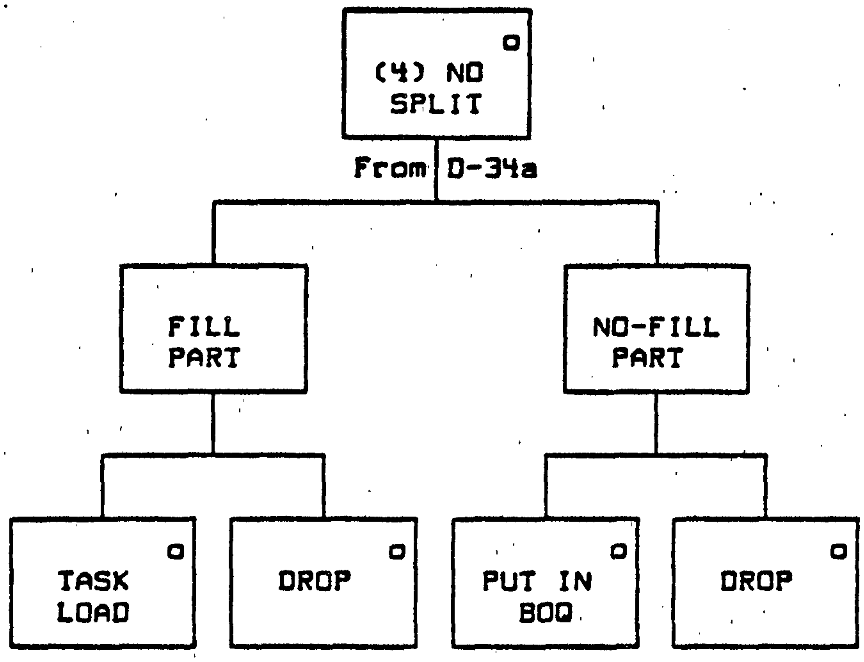

Figure D-34b. F-TU-DECISION generator (continued)

D-F15

GENERATOR DESCRIPTION: F-TU-DECISION

1. RECEIVE PROMPT. Read input parameters at D1.

2. GET TU DECISION. Request decision from TU regarding no-fill list by invoking F-SPLIT-CK (D2: C-F13). The SUPPLIER receives the TU's decision at D3.

3. SPLIT. If the original TU is split into 2 TUs, the decisions available are 1 or 2. The first tasks the supply base to load the fill list on to the original TU and to forget about the no-fill list. This would be the case when part of the convoy would stay at this supply base to get what was available and the rest would proceed to another base to hopefully get the rest of the order. The second decision (2) also tasks the supply base to load the original TU with the fill list and puts the new TU in the backorder queue (BOQ) to wait for arrival of the goods to fill the no-fill list. There should not be an occasion when a split occurs that both lists are dropped. (Note: the BOQ is not discussed here. It is a set of utility routines developed to manage this queue.)

4. NO SPLIT. If no split occurs, decisions 1 and 3 are the only ones available. The first tasks the supply base to load the fill list onto the TU and departs either for home or another supply base. The third decision allows the same options except the TU does not take any of the fill order. Again, it either goes home or to another supply base. The supply base does not care which the TU does; it simply drops the no-fill list.

5. RETURN. Delivers the fill list back to F-ARRIVE-SUPPLIER (D4: D-F12). It is zero if the decision were 3 (D3).

D-F16 F-LIFT-JOB TYPE: Interactive Function

SUMMARY: This function simulates a supply base being tasked to perform a lift (load or unload) job. It tries to determine the best way to get it done considering other jobs it is doing and the limited work assets it has for doing them. For some supply types, the lift jobs at supply base are known beforehand to be of equal priority, so they are treated in a FIFO manner. For others, the size of the new lift job, amount of currently available work assets, and information about other competing lift jobs must be determined. This information, along with other information about the job, the status of the SUPPLY-CUSTOMER, etc., is passed to the decision maker for a decision on the job priority (i.e., the order it should be serviced in relation to the other jobs and the amount of work assets it should receive). The function then accommodates the decision by either putting the job on the job queue according to the assigned priority, or assigning a part of the work assets to the job. If that means diverting assets away from on-going job(s), then the scheduled completion times are rescheduled because of the change in the assigned work assets. The on-going jobs are put on the job queue if all of their work assets were diverted.

TRIGGERED BY: F-ARRIVE-SUPPLIER (D-F12)
F-ARRIVE-CUSTOMER (D-F17)

RESULTING IN: Schedule or reschedule:

A-BEGIN-LOAD	(C-F13)	Transportation
A-BEGIN-UNLOAD	(C-F11)	Transportation
A-END-LOAD	(C-F14)	Transportation
A-END-UNLOAD	(C-F12)	Transportation

SYSTEM SPECIFICATION DIAGRAM (SSD): F-LIFT-JOB

See figure D-35.

D-F16

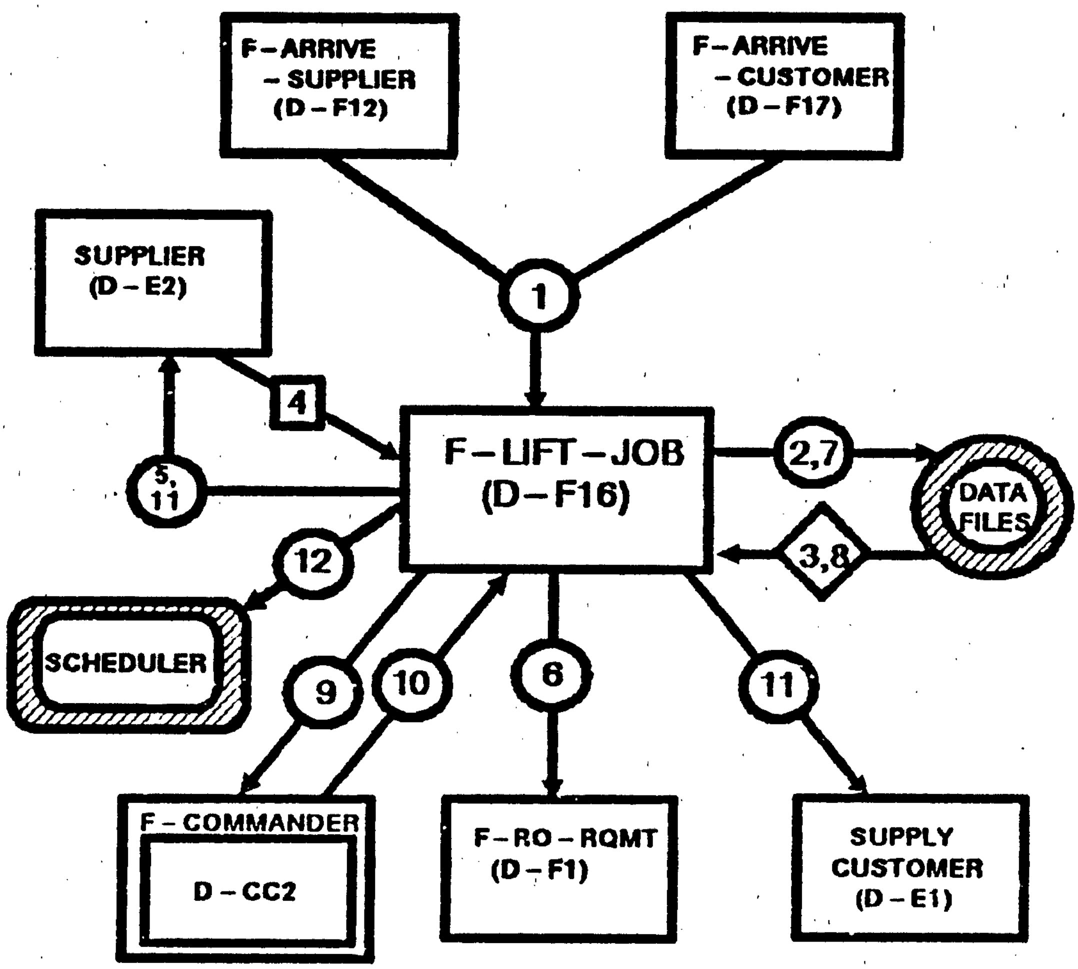

FIGURE D-35. F-LIFT-JOB SSD

DATA DEFINITION: F-LIFT-JOB

Connection Number	Data Transferred	Comments
D1	Information passed by the invoking function (D-F12 or D-F17):	
	o SUPPLY-CUSTOMER ID	The supply base or user unit needing the supplies.
	o SUPPLIER ID	The unit providing the supplies.
	o TU ID	The identification of the transportation unit that arrived.
	o Lift job list	(Supply type, item#, quantity)*.
D2	Parameters passed to access data file at D3:	
	o Supply type	
	o Supply item ID	
S3	Data file (D-D6) containing supply item information:	
	o Lift requirement	Positive = weight/item; Negative = load time/item; Zero = not used.
S4	Information from the SUPPLIER's state vector:	
	o Auth. work assets	The authorized total lift capability of MHE on-hand [illegible] per hour.
	o Amount occupied	Amount being used per hour.
	o Maximum amount	Maximum amount of lift capability available per hour for the supply base type. This is the max amount of work assets that can work on one job at a time.

DATA DEFINITION: F-LIFT-JOB (cont.)

Connection Number	Data Transferred	Comments
S4	Information from the SUPPLIER's state vector (cont.):	
	o Minimum amount	Minimum amount of lift capability available per hour. This indicates at least one MHE type working on a job.
	o Unit effectiveness	
	o Suppression level	
D5	Parameters for putting/checking jobs on the job queue:	
	o SUPPLY-CUSTOMER ID	
	o TU ID	
	o Fill list	(Supply ID, item#, quantity)*.
	o Lift requirement	Total weight of remaining job.
	o Lift assigned	Also flags if on-going job queue (OJQ) or waiting job queue (WJQ) for lift.
	o End time	On-going jobs have a scheduled completion time.
D6	Parameters to schedule F-RC-RQMT (D_F1):	
	o Support flag	Set = 0 for single unit. This is the usual case, so the modules that call Supply for single unit supply checks are set to 0.
	o Unit ID	When checking a supply type of an individual unit.
	o Supply type	
D7	Parameter passed to access data file at S8:	
	o Supply type	

D-F16

DATA DEFINITION: F-LIFT-JOB (cont.)

Connection Number	Data Transferred Comments
S8	Information on supply types data file (D-DF5): o RO flag
D9	Information passed to F-COMMANDER (D-CC2) for a decision: o SUPPLY-CUSTOMER ID o SUPPLIER ID o Job fill list
D10	Decision returned by F-COMMANDER: o Job priority
D11	Information needed to trigger A-BEGIN-LOAD/A-BEGIN-UNLOAD: o SUPPLIER ID o SUPPLY-CUSTOMER ID o TU ID o Lift requirement o Storage requirement
D12	Information needed to schedule A-END-LOAD/A-END-UNLOAD: o SUPPLY-CUSTOMER ID o SUPPLIER ID o TU ID o Fill list

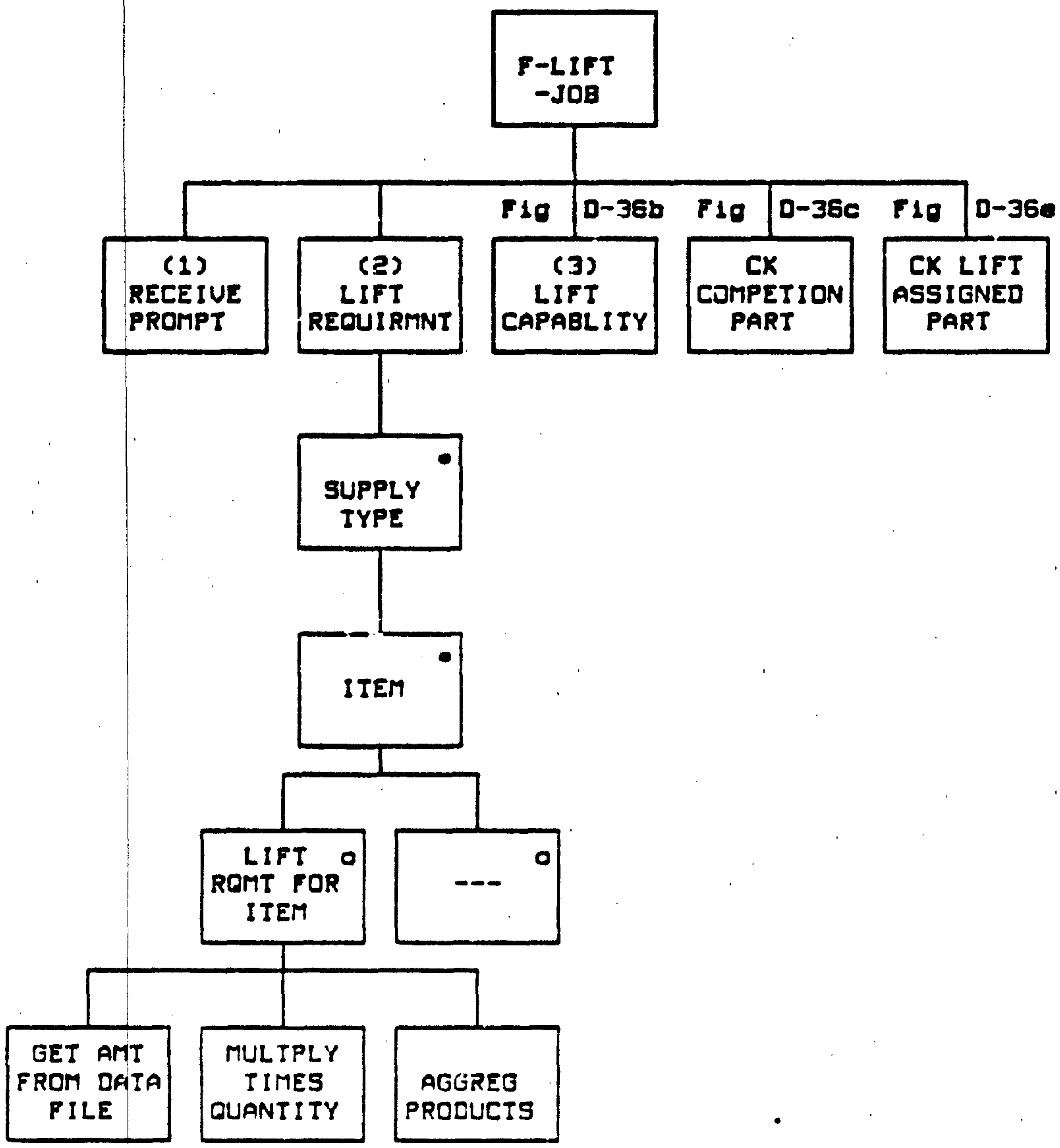

Figure D-36a. F-LIFT-JOB generator

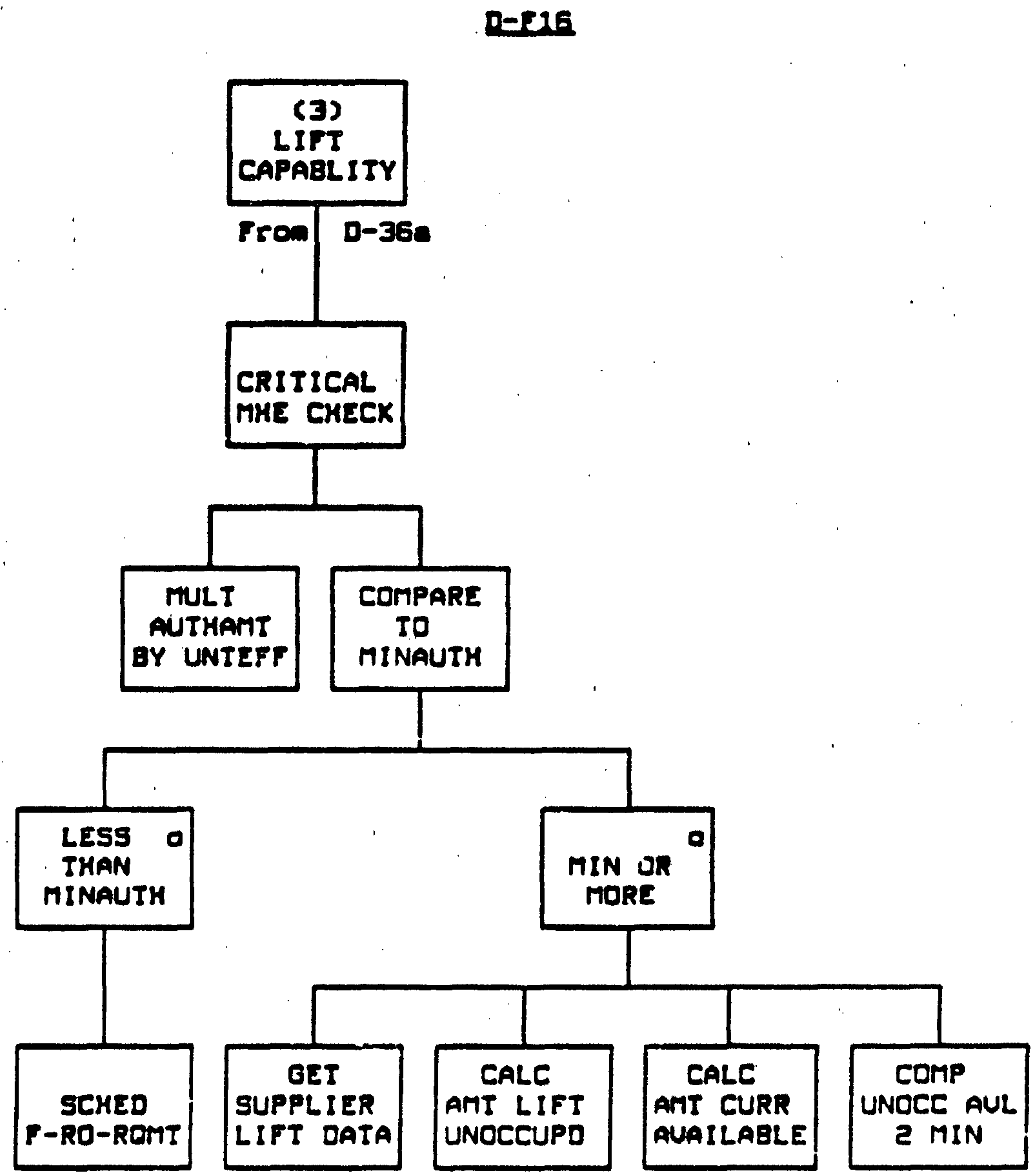

Figure D-36b. F-LIFT-JOB generator (continued)

D-F16

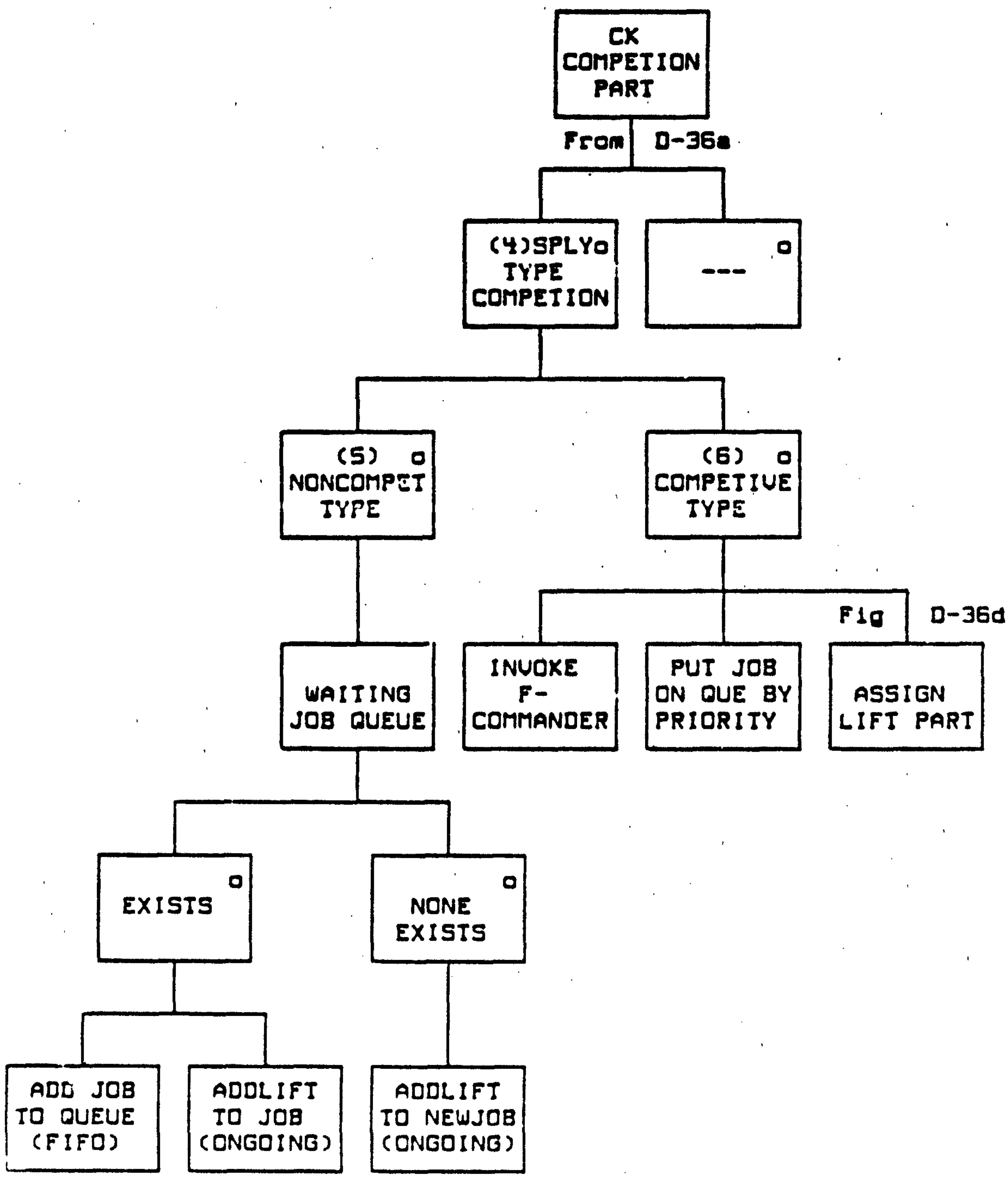

Figure D-36c. F-LIFT-JOB generator (continued)

D-F16

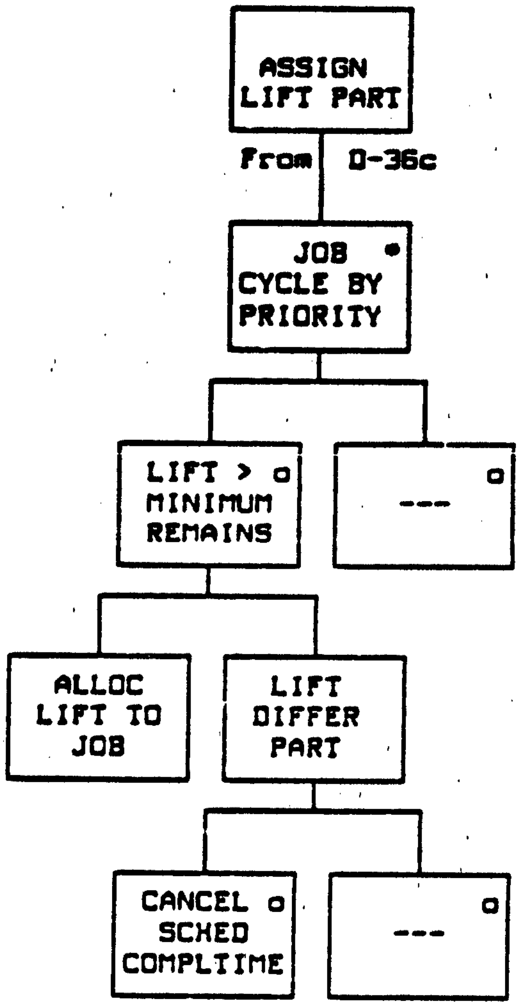

Figure D-36d. F-LIFT-JOB generator (continued)

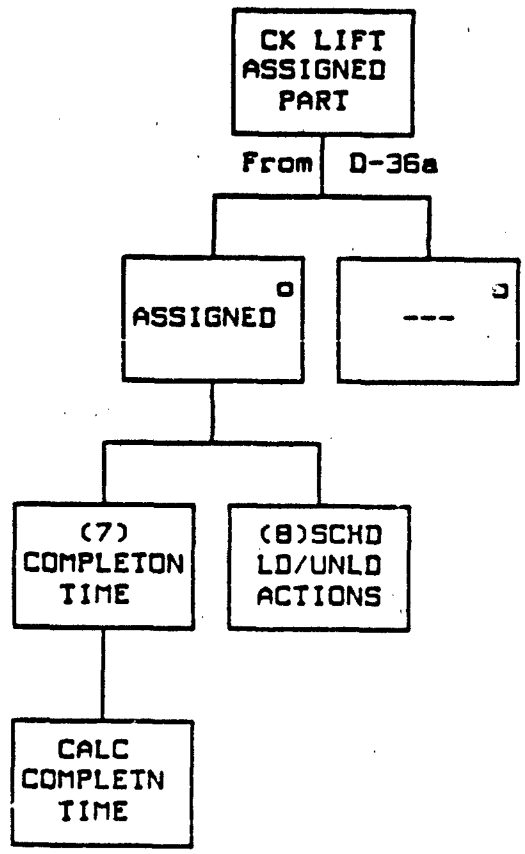

Figure D-36a. F-LIFT-JOB generator (continued)

GENERATOR DESCRIPTION: F-LIFT-JOB

1. RECEIVE PROMPT. Read D1.

2. LIFT REQUIREMENT. Begin cycling through the job item list to determine the job's lift requirement. If the supply item has a positive lift requirement (D2/S3), calculate the amount by multiplying it times the item quantity and totaling the amount for all of the supply items. The result is the total lift requirement of the job.

3. LIFT CAPABILITY. Multiply the unit effectiveness times the authorized amount of work assets and compare it to the minimum amount. If less than the minimum, put the job on the job wait queue (WJQ: D5) and schedule resupply of MHE (D6: F-RO-RQMT, D-F1). Otherwise, get the amount of work assets (lift) occupied (S4). Subtract the amount from the authorized (S4) to get the unoccupied amount. Multiply this times the unit effectiveness (S4) to get the amount of lift currently available. If the result is less than the minimum, then continue to paragraph 4.

4. SUPPLY TYPE COMPETITION. Check the competitive (RO) flag of the supply type (D7/S8). If it is zero, the supply type is noncompetitive and treated in a FIFO manner. If greater than zero, it is competitive and must compete with other jobs for limited work assets according to priority. (Comment: This may seem inconsistent, because several supply types may be in one order. However, it should work out because mixed orders to a supply base have the same priority; otherwise there is only one supply type in the order.)

5. NONCOMPETITIVE SUPPLY TYPES. Check for a waiting job queue (WJQ, S4) by seeing if any jobs on the queue do not have work assets assigned. If one exists, put the new lift job at the back (D5). If unoccupied work assets are available greater than the minimum amount, take the first job off of the WJQ. Assign work assets to the job up to the amount available, not to exceed the maximum amount. This flags the job as being on the on-going queue (OJQ, D5).

F-LIFT-JOB (cont.)

6. COMPETITIVE JOBS. If jobs are in the queue, a decision must be made by the supply base commander on the priority of the new job so that the scarce MHE assets can be allocated to the competing jobs. Invoke F-COMMANDER (D9) to assign a job priority. Once a priority is assigned (D10) to the job, put it into the queue with the other jobs according to priority. Begin cycling through the jobs starting with the highest priority job and working toward the lowest. Allocate the work assets to each job. If the amount of work assets changes from what it was when previously scheduled, its completion time is rescheduled. Continue cycling through the jobs until all of the work assets above the minimum are allocated to the job in the queue (D5). (Note: Changing the work assets assigned to an already on-going job will require diverting work assets away from a job they are now doing. If that is the case, the scheduled time for finishing the on-going job is changed). Divide the amount of remaining lift requirement of a job by the lift capability assigned to it to determine the expected completion time.

7. COMPLETION TIME. Determine the length of time to perform the job by dividing the total lift requirement by the amount of work assets assigned to it and multiplying that times (1.0 + suppression level).

8. SCHEDULING. For those jobs that are on-going, the scheduled A-BEGIN-LOAD/A-BEGIN-UNLOAD (D11) should begin immediately and their A-END-LOAD/A-END-UNLOAD (D12) actions should be scheduled at the end of the time to complete the job. Return to the invoking function without information.

D-F17 F-ARRIVE-CUSTOMER TYPE: Interactive Function

SUMMARY: This function simulates the arrival and servicing of a loaded transport unit (TU) at a SUPPLY-CUSTOMER (D-E1, user unit or supply base). The TU is first assessed to see if it was interdicted enroute. If so, F-TU-LOSSES (D-F13) is invoked to find the supply order losses and to adjust the number of vehicles currently authorized to the TU. Next, if the receiving SUPPLY-CUSTOMER is a supply base, several special considerations are made: ALLOCATIONS at all supply bases in the support area are checked and serviced if any of the arriving supplies are needed to help fill them. The same applies to the backorder queue (BOQ) at the receiving supply base. (Note: the reason ALLOCATIONs and BOQs are serviced before unloading is to simulate "tailgating" (TG) which is the transloading of supplies over the tailgate of the TU to the waiting trucks.) Before the remaining cargo can be unloaded at a supply base, the lift and storage requirements of the order (if any), and the current capability of the supply base to perform the lift job must be determined and the storage (if required) provided. Any inability to unload the shipment because of storage limitations is reported to the TU commander so he can decide if he wants to split off any empty vehicles into another TU to return to home base for further job assignments or let the empties wait for the other vehicles to be unloaded.

TRIGGERED BY:	F-ATOBJ-GRND	(C-F10)	Transportation
	F-ATOBJ-AIR	(C-F11)	Transportation
RESULTING IN:	F-TU-LOSSES	(D-F13)	
	SUPPLIER	(D-E2)	
	ALLOCATION	(D-E3)	
	A-COMMIT-ALLOC	(D-A7)	
	F-TU-DECISION	(D-F15)	
	F-LIFT-JOB	(D-F16)	
	F-FILL-WAITING	(D-F18)	
	F-SUPPLY-STORE	(D-F19)	

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-37.

D-F17

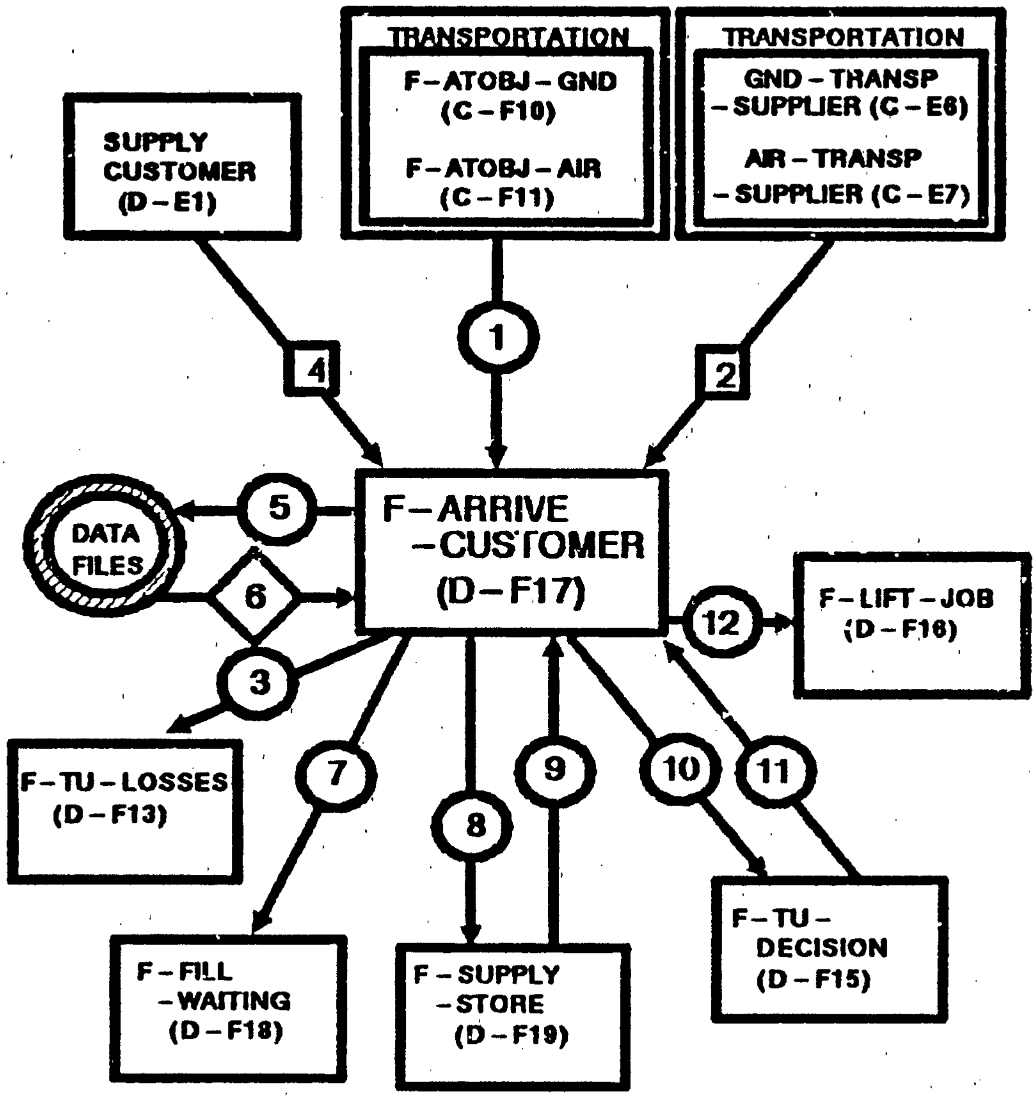

FIGURE D-37. F-ARRIVE-CUSTOMER SSD

DATA DEFINITION: F-ARRIVE-CUSTOMER

Connection Number	Data Transferred	Comments
D1	Prompt received from arriving TU:	
	o TU ID	The identification of the transportation unit arriving at the SUPPLY-CUSTOMER.
S2	Information required from the TU:	
	o SUPPLY-CUSTOMER ID	The supply base or user unit receiving the supplies.
	o SUPPLIER ID	The unit that provided the supplies.
	o Order data	(Supply ID, item#, quantity)* authorized, on-hand, etc.
	o Systems effective	The fraction of TU's authorized cargo vehicles on-hand. This should start out as 1.0 and be changed to a fraction less than 1.0 by a combat module when the TU is shot up.
D3	Parameters passed to F-TU-LOSSES (D-F13):	
	o TU ID	If interdicted enroute, sets TU cargo vehicles authorized to number surviving and reduces the order expected (due-ins) at the SUPPLY-CUSTOMER by the amount of lost carrying capacity.

D-F17

DATA DEFINITION: F-ARRIVE-CUSTOMER (cont.)

Connection Number	Data Transferred	Comments
S4	State vector data from the receiving SUPPLY-CUSTOMER (D-E1):	
	o Unit type	
	o Echelon	
	o Function	
	o Storage capacity	Requirement and capability to store the supply type.
D5	Parameters passed to access data file (D-DF5) at D5:	
	o Supply type	
	o Unit SRC	
	o Echelon	
S6	Needed from Supply Type Characteristic data file (D-DF5):	
	o TG flag	Indicates if TG of the supply type at the SRC/echelon of the SUPPLY-CUSTOMER is okay.
	o Storage flag	Indicates if storage of the supply type at the CUSTOMER SRC and echelon is required.
D7	Passed to F-FILL-WAITING (D-F18):	
	o SUPPLY-CUSTOMER ID	Receiving supply base.
	o Owning unit ID	Arriving loaded TU.
D8	Passed to F-SUPPLY-STORE (D-F19):	
	o SUPPLY-CUSTOMER ID	Receiving unit.
	o TU ID	Arriving loaded TU.
	O Unload list	(Supply ID, item#, quantity)*.

DATA DEFINITION: F-ARRIVE-CUSTOMER (cont.)

Connection Number	Data Transferred	Comments
D9	Returned from F-SUPPLY-STORE (D-F19):	
	o Can-store list	(Supply ID, item#, quantity)*.
	o Cannot-store list	(Supply ID, item#, quantity)*.
D10	Information passed to F-TU-DECISION (D-F15):	
	o TU ID	
	o Last SUPPLIER flag Not applicable.	
	o Unload list	(Supply ID, item#, quantity)*.
	o No unload list	(Supply ID, itdm#, quantity)*.

(Note: F-TU-DECISION is invoked by F-ARRIVE-SUPPLIER and F-ARRIVE-CUSTOMER. The information passed from each of these functions differs. The last SUPPLIER flag is not used here nor is any data returned to this function. The explanation is that the SUPPLY-CUSTOMER does not care about the result of the TU commander's decision as long as the part of the original TU needed for any storage remains until sufficient organic storage is available.)

Connection Number	Data Transferred	Comments
D11	Passed to F-LIFT-JOB (D-F16):	
	o SUPPLY-CUSTOMER ID	The supply base or user needing the supplies.
	o SUPPLIER ID	The unit providing the supplies.
	o TU ID	The identification of the arriving TU.
	o Lift job list	(Supply ID, item#, quantity)*.

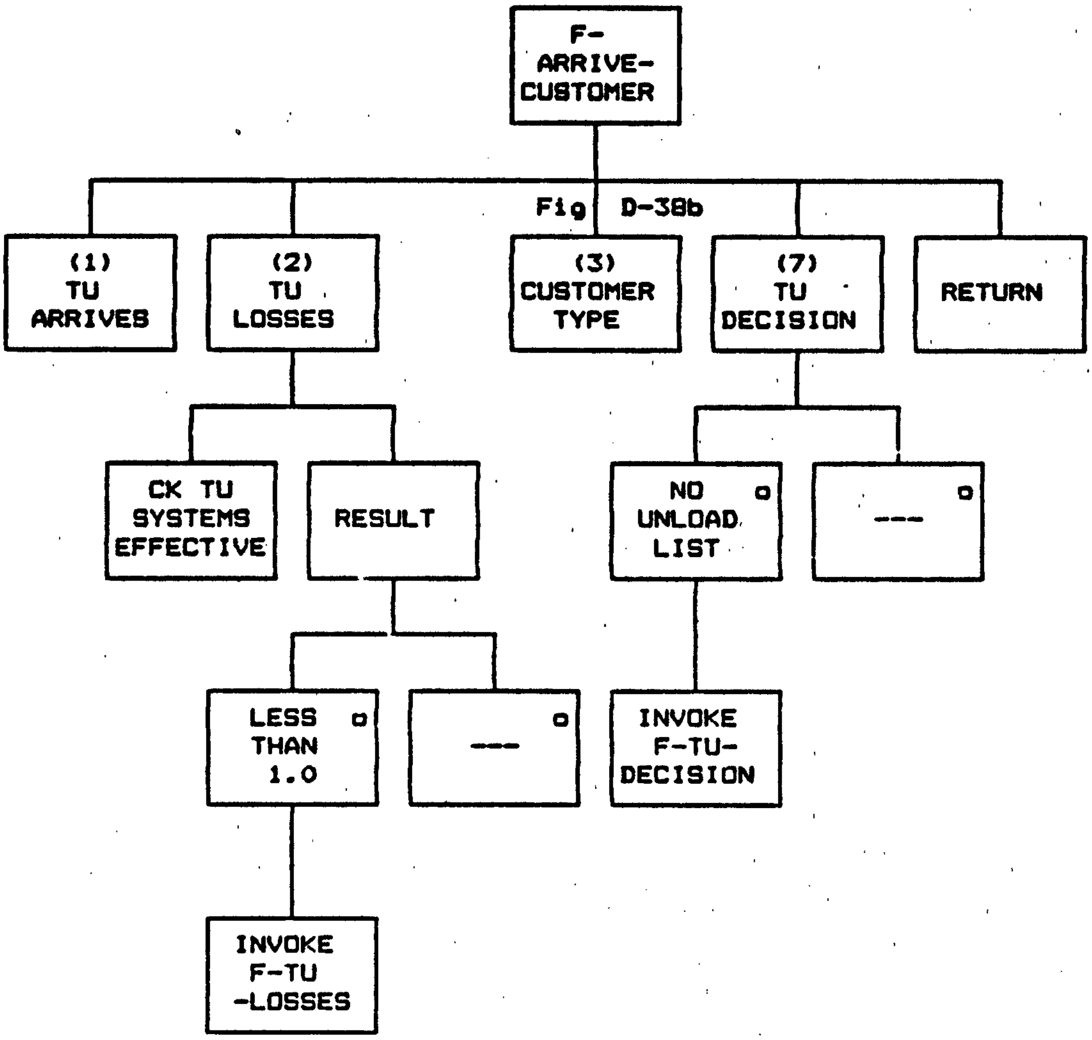

Figure D-38a. F-ARRIVE-CUSTOMER generator

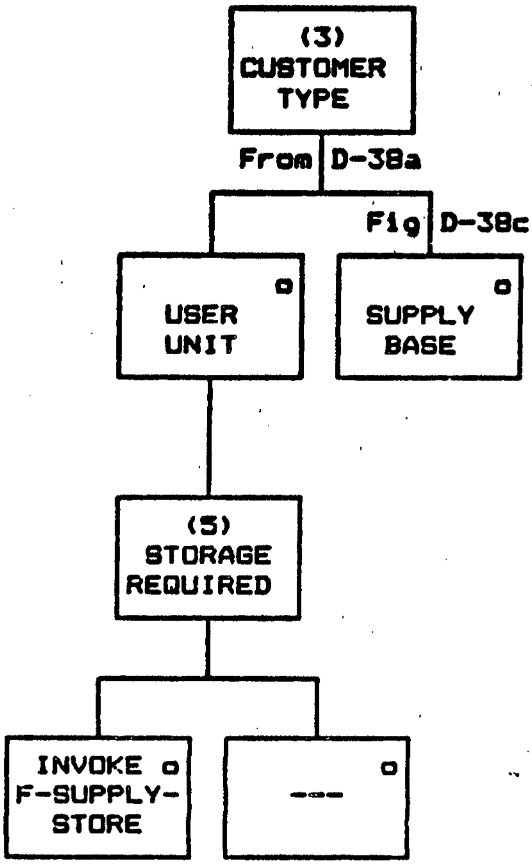

Figure D-38b. F-ARRIVE-CUSTOMER generator (continued)

D-F17

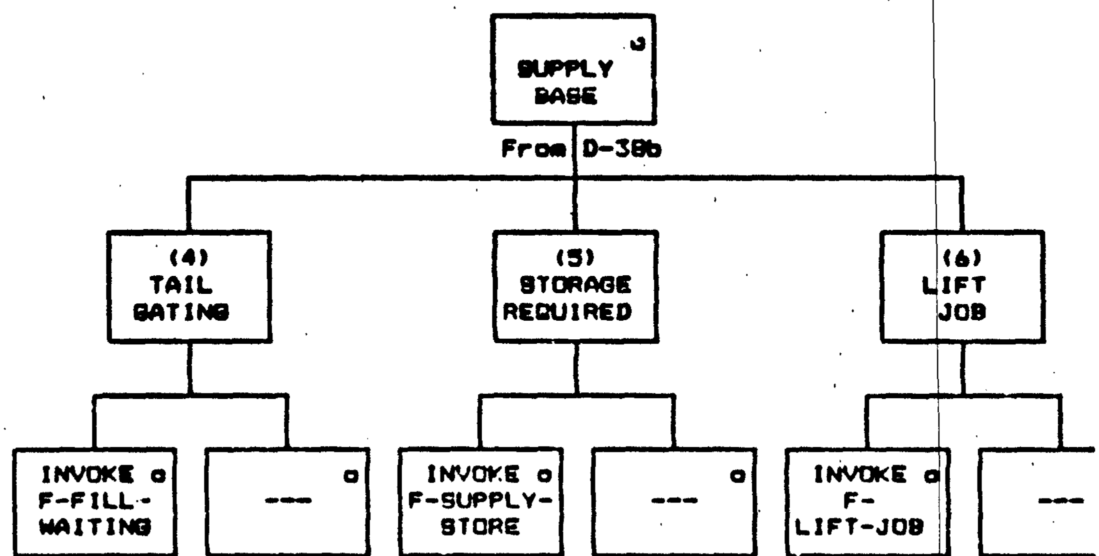

Figure D-38c. F-ARRIVE-CUSTOMER generator (continued)

GENERATOR DESCRIPTION: F-ARRIVE-CUSTOMER

1. TU ARRIVES. Get the TU's ID (D1).

2. TU LOSSES. Ascertain if the TU suffered interdiction enroute by checking its effective systems (S2). If the TU cargo systems effective is less than 1.0, the TU suffered interdiction, so call F-TU-LOSSES (D3: D-F13). This function adjusts downward, by the fraction of vehicles lost, the TU's cargo vehicles authorized to the number on-hand and the amount of supplies expected to arrive (due-ins) at the SUPPLY-CUSTOMER (D-E1) .

3. CUSTOMER TYPE. If the SUPPLY-CUSTOMER is a supply base (S4) being replenished with supplies that it stocks for other SUPPLY-CUSTOMERs, several events peculiar to these SUPPLY-CUSTOMER types may occur. Some supply types/items are transloaded from the arriving TU onto waiting TUs with orders needing the supplies; other supply items wait until unloading or trailer-swapping occurs and the supplies are ready for issue. If tailgating is allowed for arriving supply items, ALLOCATIONs at local supply bases waiting for the arriving supplies are serviced, then any backorders at the receiving supply base are serviced. After tailgating, storage and lift capability checks are made and unloading (or trailer-swapping) proceeds. After unloading the TU, the remainder of the items in ALLOCATIONs and backorders are serviced before general issuing begins.

4. TAILGATING. Check the TG flag (D5/S6) for the supply type. If okay, invoke F-FILL-WAITING (D7: D-F18) to perform ALLOCATION and BOO servicing; else, continue to the storage check.

5. STORAGE REQUIRED. Check if the SUPPLY-CUSTOMER has a storage capacity for the supply type (S4). If yes, invoke F-SUPPLY-STORE (D8: D-F19).

6. LIFT JOB. If an unload list is returned from F-SUPPLY-STORE (D9) or exists as the arriving order because storage was not required, the lift job is identified, so invoke F-LIFT-JOB (D12: D-F16).

7. TU DECISION. If a no-unload list is returned from F-SUPPLY-STORE (D9), invoke F-TU-DECISION (D10) to notify the TU commander that some of the TU is needed for temporary storage. This allows splitting the original TU into 2 TUs, so the empties can be returned to home base for other assignments and the remainder can stay to provide temporary storage. The TU commander may decide not to split the TU (D11).

D-F18 F-FILL-WAITING **TYPE: Interactive Function**

SUMMARY: This function simulates the servicing of supply orders waiting for supplies to arrive at the supporting supply base. It services ALLOCATIONs before backorders, assuming they are higher priority. It checks and fills all ALLOCATIONs in the support area that need the arriving supply items and that can be tailgated. It then does the same with backorders at the receiving supply base SUPPLY-CUSTOMER.

TRIGGERED BY:	F-ARRIVE-CUSTOMER	(D-F17)
	SUPPLY-CUSTOMER	(D-E1)
	A-END-UNLOAD	(D-A5)
RESULTING IN:	SUPPLIER	(D-E2)
	ALLOCATION	(D-E3)
	A-COMMIT-ALLOC	(D-A7)
	Update supply base SUPPLY-CUSTOMER 200	

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-39.

D-F13

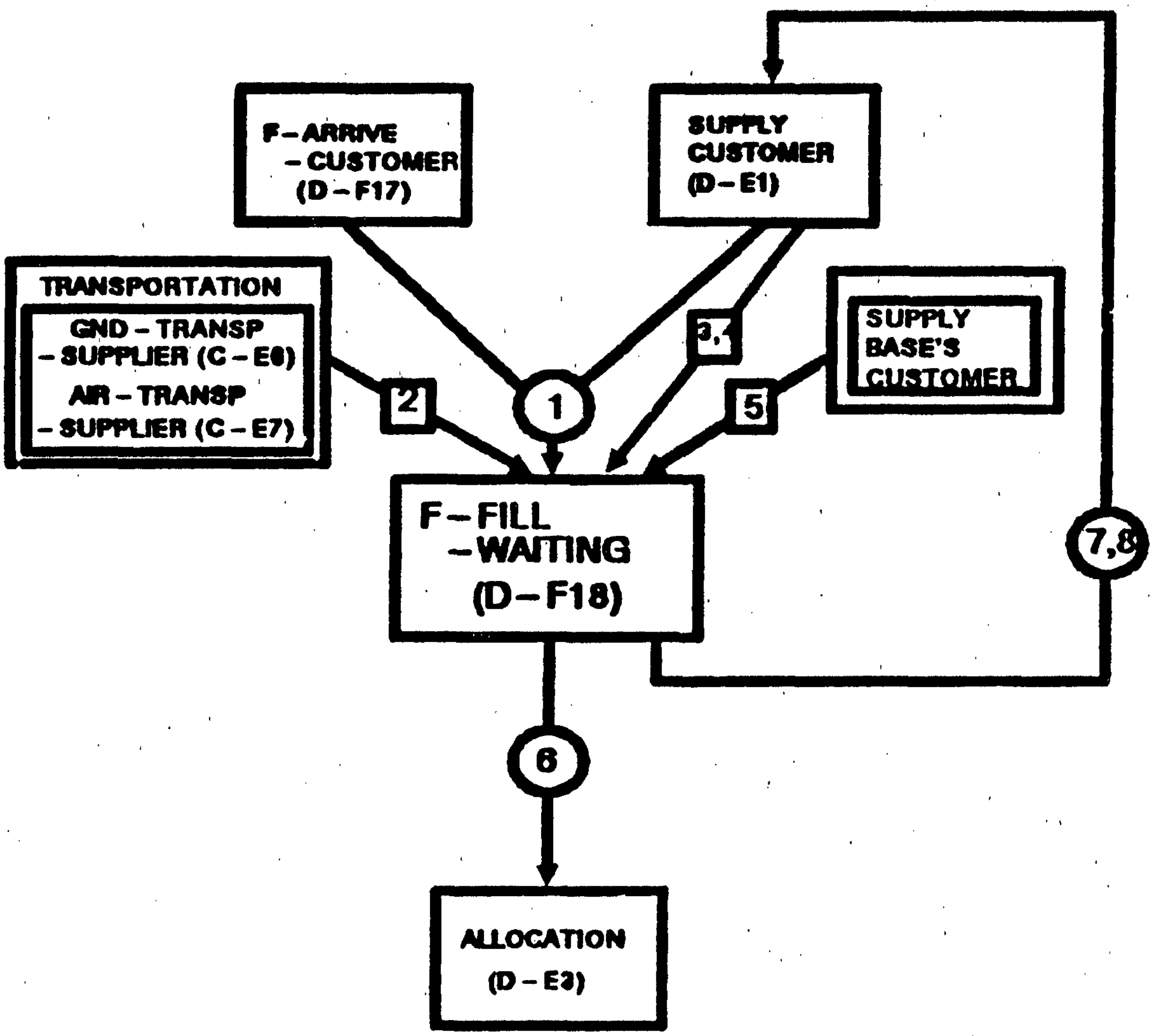

FIGURE D-39. F-FILL-WAITING SSD

D-F18

DATA DEFINITION: F-FILL-WAITING

Connection Number	Data Transferred	Comments
D1	Received from invoking process:	
	o SUPPLY-CUSTOMER ID	Receiving supply base.
	o Owning unit ID	The arriving loaded TU, or the receiving supply base.
S2	Required from the current owning unit (either TU or SUPPLY-CUSTOMER):	
	o Supply order data	(Supply ID, item#, quantity)*
S3	Required from the SUPPLY-CUSTOMER:	
	o Unit type	
	o Echelon	
	o SUPPLY-CUSTOMER list	List of the receiving SUPPLY-CUSTOMER's SUPPLY-CUSTOMERs.
	o ALLOCATION file	Receiving supply base's
	o BOQ	ALLOCATIONs and backorder queue.
S5	Required from each supported supply base SUPPLY-CUSTOMER:	
	o Unit type	Only supply base
	o Echelon	CUSTOMERs in the same support area.
	o ALLOCATION file	If any exist.
	o Unfilled Supply rqmts	(Supply ID, item#, Quantity)*.
D6	Update ALLOCATION (A-COMMIT-ALLOC), D-A7):	
	o Unit ID	Current owning unit.
	o Unit ID	ALLOCATION supply base ID.
	o ALLOCATION ID	ALLOCATION filled.
	o Part-fill list	(Supply ID, item#, Quantity)*, committed.

DATA DEFINITION: F-FILL-WAITING (cont.)

Connection Number	Data Transferred	Comments
D7	Pass to A-END-LOAD (D-A3):	
	o SUPPLY-CUSTOMER ID	
	o SUPPLIER ID	
	o SUPPLIER's inventory	(Supply ID, item#, Quantity)*.
	o TU ID	
	o TU's inventory	(Supply ID, item#, Quantity)*.

D-F18

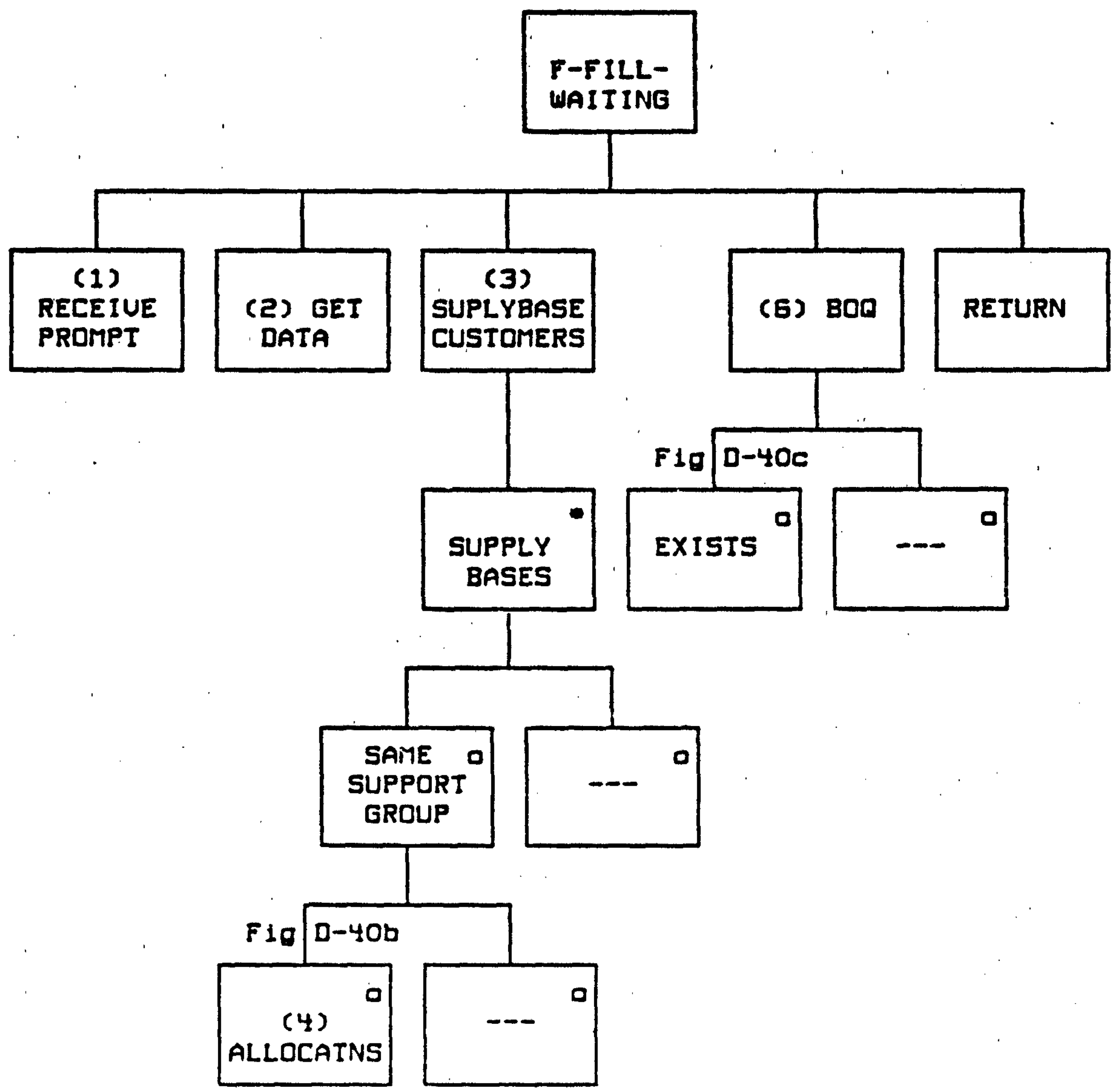

Figure D-40a. F-FILL-WAITING generator

D-F18

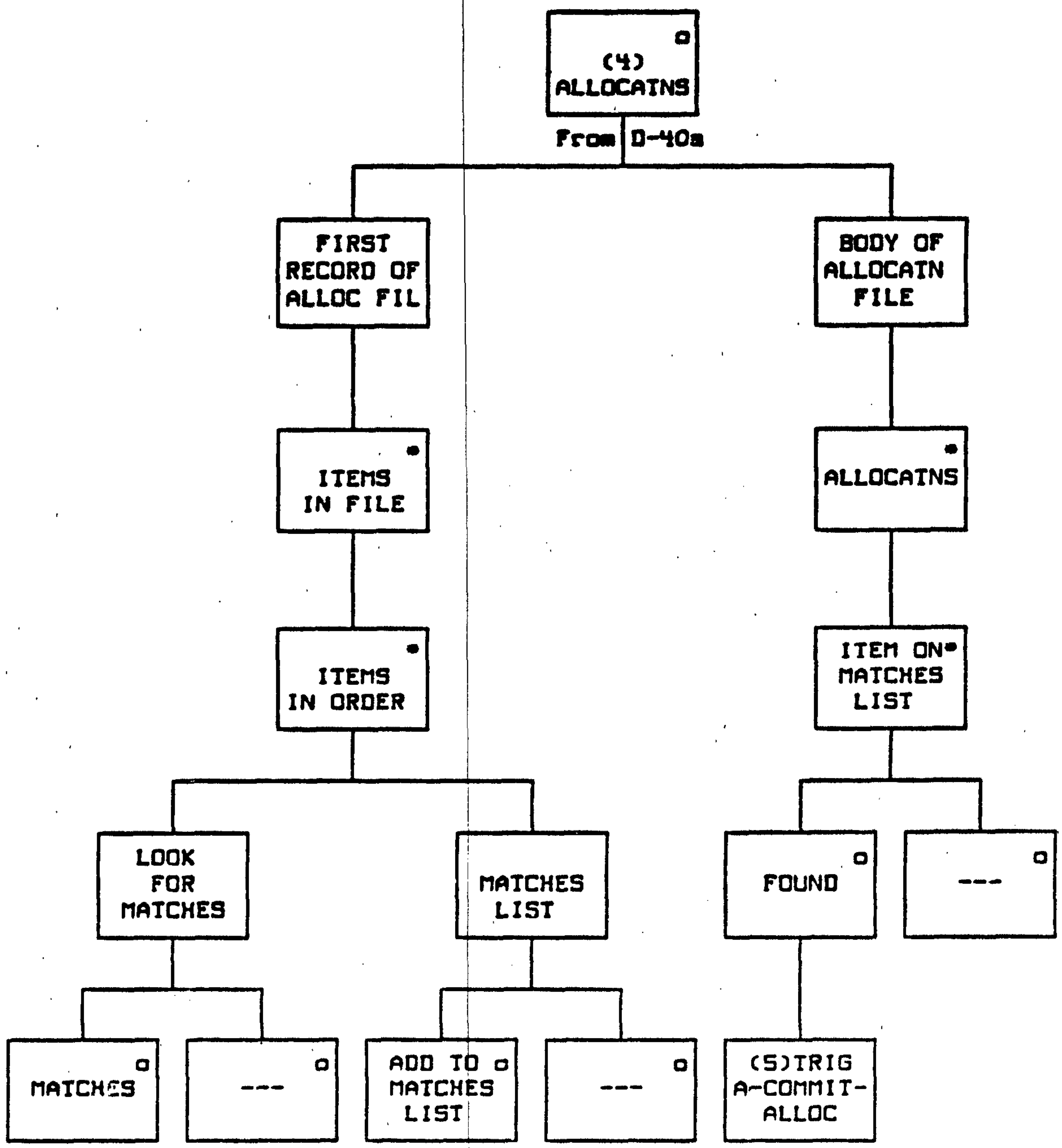

Figure D-40b. F-FILL-WAITING generator (continued).

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D-F18

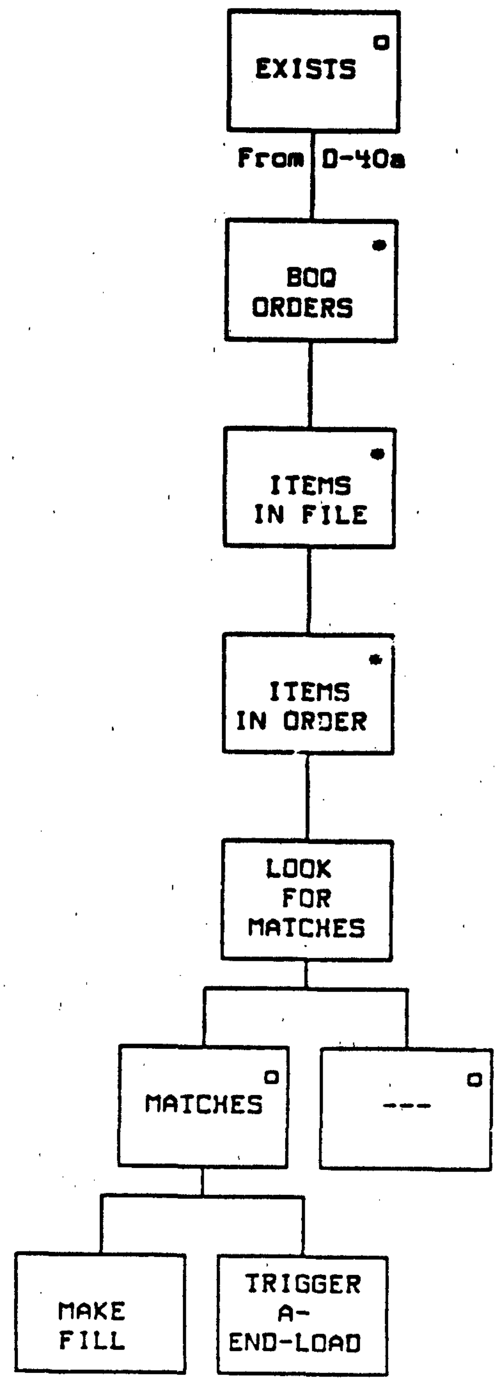

Figure D-40c. F-FILL-WAITING generator (continued)

D-F18

GENERATOR DESCRIPTION: F-FILL-WAITING

1. RECEIVE PROMPT. Read parameters (D1). Check the unit ID numbers. If the unit ID numbers are different, the TU is not unloaded; tailgating (TG) is proceeding. If the unit numbers are the same, the TU is unloaded and waiting orders are processed.

2. GET DATA. Get the supply order data (S2) from the owning unit and the data at S3 from the SUPPLY-CUSTOMER (D-E1).

3. SUPPLY BASE CUSTOMERS. Cycle through supply bases in the support area that may have ALLOCATIONs waiting for the arriving supplies. Begin with the receiving supply base.

4. ALLOCATIONs. Once a unit is found with an ALLOCATION file (S4), begin by checking the first record of the ALLOCATION file which summarizes the supply item status of all ALLOCATIONs in the file for the supply base. Compare the items in the summary data with those in the arriving order list (S2). If none match, continue through the SUPPLY-CUSTOMER list. If a match is found, cycle through the ALLOCATIONs in the file until the item is found (S5). Find the amount of the supply item requirement that can be filled by taking the minimum of the requirement and the amount of arriving supply that remains.

5. COMMIT SUPPLIES. Trigger A-COMMIT-ALLOC (D6: D-A7) which updates the ALLOCATION and the supply status of the TU. Continue through the ALLOCATIONs for the item until the item is gone or the ALLOCATIONs for the supply base have all been serviced. Continue through the supply bases until finished or there are no more supplies.

6. BOQ. If arriving supplies still remain and the receiving supply base has backorders (S3), begin filling orders in the BOQ with any of the remaining, matching supplies on the TU. If a backorder is filled, trigger A-END-LOAD (D7: D-A3); otherwise, return the order to the backorder queue (D8).

D-F19 F-SUPPLY-STORE TYPE: Interactive Function

SUMMARY: This function simulates a supply base SUPPLY-CUSTOMER receiving a loaded TU with some supplies that requires storage. The storage requirement of the arriving supplies and the supply base SUPPLY-CUSTOMER's current storage capacity for the supplies must be found. The amount of storage requiring supplies that can be unloaded from the TU are limited by the amount of available storage. If some of the supplies cannot be unloaded because of storage, part of the TU must provide temporary storage.

TRIGGERED BY: F-ARRIVE-SUPPLIER (D-F12)
F-ARRIVE-CUSTOMER (D-F17)

RESULTING IN: A "can-store" and a "cannot-store" list.

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure D-41.

D-F19

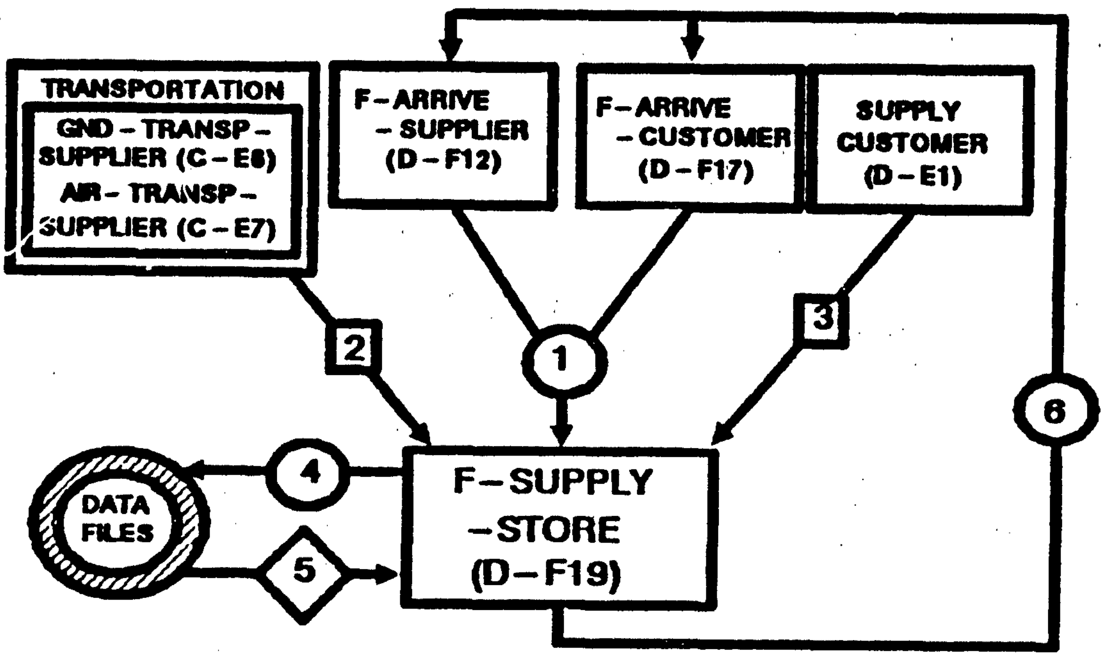

FIGURE D-41. F-SUPPLY-STORE SSD

D-F19

DATA DEFINITION: F-SUPPLY-STORE

Connection Number	Data Transferred	Comments
D1	From invoking function:	
	o SUPPLY-CUSTOMER ID	Receiving unit.
	o TU ID	Arriving loaded TU.
	o Unload list	(Supply ID, item#, quantity)*.
S2	TU state vector data:	
	o Systems effective	For arriving cargo vehicles.
S3	Required from the SUPPLY-CUSTOMER (D-E1):	
	o Storage capacity	SUPPLY-CUSTOMER's total authorized storage capacity/item.
	o Temporary storage	TU storage provided until empty. Use and release ASAP.
	o Current fill	Total amount filled per item before TU arrival.
D4	Parameters needed to access file at S5:	
	o Supply type	
	o Item ID	
S5	Data file for supply item storage requirement:	
	o Storage amount	Depends on the supply type: liquid (gals/ltrs) or dry (weight/volume). It must be the same as the storage containers.
D6	Return to invoking function:	
	o Can-store list	(Supply ID, item#, quantity)*.
	o Cannot-store list	(Supply ID, item#, quantity)*.

D-F19

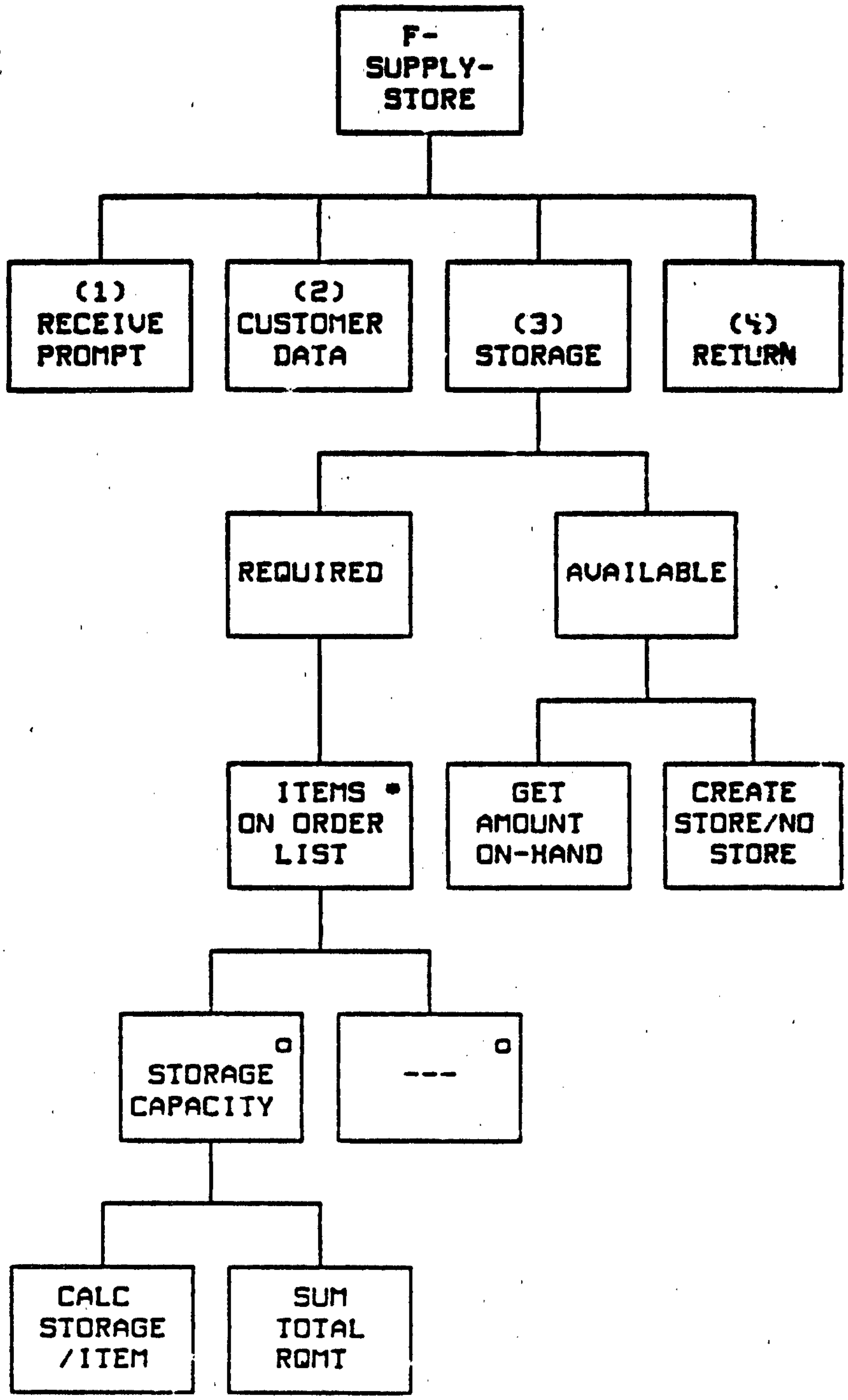

Figure D-42. F-SUPPLY-STORE generator.

D-F19

GENERATOR DESCRIPTION: F-SUPPLY-STORE

1. RECEIVE PROMPT. Read data at D1.

2. SUPPLY-CUSTOMER DATA. Get the data at S3 from the receiving SUPPLY-CUSTOMER's state vector.

3. STORAGE. Cycle through each item type remaining on the TU (S2), get its authorized storage capacity (if required) at the receiving SUPPLY-CUSTOMER (S3). Multiply the amount of authorized storage capacity times the fraction of systems effective (S2) to get the current capacity. Subtract the amount of the item on-hand from the current capacity to get the amount of storage currently available. Get the storage requirement for each item to be stored by multiplying the quantity (D1) times its storage requirement for one (D4/S5).

4. RETURN. Return the can-store and cannot-store lists to the invoking functions (D6).

APPENDIX E

PERSONNEL OPERATIONS

The personnel operations appendix includes the sections listed below. Note that reference numbers are coded to indicate both the functional area (the appendix letter [E] is used) and the type (E = entity, A = action, F = function) involved. Thus, E-A1 refers to the first action listed in personnel operations (appendix E). For information on the JSD diagram notation discussed, see appendix A.

1. Entity list. The entity list contains the reference number, the name, and the definition (summary and attributes) of each entity used in personnel operations.

2. Action list. The action list contains the reference number, the name, and the definition (summary, attributes, generators, and associated entities) of each action belonging to the entities in personnel operations.

3. Entity-action diagrams and cross-reference table. The cross-reference table provides a mapping of entities and actions. One JSD entity-action structure diagram is provided for each entity. Following each diagram is a narrative description of each action shown.

4. Generator function list. The function list contains the reference number, name, and definition (summary, triggering mechanisms, and resulting actions) of each function associated with personnel operations. Detailed descriptions of each function are contained in the annex.

5. Annex. The contents of the annex are described below:

a. Dispatcher. The dispatcher serves as a road map to the functions. It is not a JSD structure diagram, but it is presented in tree form to show the hierarchical nature of the structure involved. The root of the tree is the dispatcher. The top-level nodes (boxes) identify the critical events occurring in personnel operations and the subsequent nodes (boxes) identify the functions and show the interrelationships involved. The calling routines and triggering mechanisms for each critical event are listed above the event node. The actions and events are caused by a function are listed below function node. Each critical event is numbered for identification purposes only; no ordering is implied. The event scheduler (SCHED) uses the critical event numbers to identify the event being scheduled by a function.

5. __Annex__ (cont.)

b. __Functions__. The following information is provided for each function belonging to personnel operations. Note that the reference number of the function (e.g., __E-F1__) appears at the top of each page.

(1) Function summary. The function summary contains the reference number, name, and definition of a function. The definition contains a summarized narrative, a list of the mechanisms which can trigger the function, and a list of the actions and functions which can result from the function.

(2) System specification diagram (SSD). The SSD is the JSD structure diagram of the data flow to and from a specified function. It shows the static relationships between the entities and functions involved; no calling sequence or hierarchical relationship is implied. In addition to the standard JSD SSD notation (see appendix A), special notation has been adopted to indicate ownership. A single box is used to denote a function or entity belonging to the specified functional area (e.g., personnel). Plain double boxes indicate functions belonging to another CSS area. The area is identified in the outer box and the functions involved are listed in the inner box. Patterned double boxes (diagonal slashes in the outer box) indicate functions belonging to the host model. Whenever possible, the particular module is identified in the inner box (e.g., movement, chemical). A timer is considered part of the CSS module and is represented by a plain double circle; data files (DF) will belong to the entire model and are depicted by a patterned double circle. Note that although more than one data file (or timer) may be used by the specified function, only one representation (circle) will appear in the diagram. The individual data files and timers will be identified in the corresponding data definition table.

(3) Data definition. This table provides a listing of the data elements and structures required for the specified function and comments on their usage. The connection numbers correspond to the data flow numbers shown on the SSD. A "D" or "S" is added to distinguish between data and state vector elements. Detailed descriptions of the data files can be found in appendices J and K.

(4) Generator diagram. The generator diagram is similar to the JSD entity-action diagram described in paragraph 3 above. Each node (box) depicts either an iteration, a selection, or a sequential step required by the process.

(5) Generator description. The generator description provides a detailed narrative of the function process. Step numbers correspond to the box numbers shown on the associated generator diagram. (Note that not all boxes are assigned a number.) Data elements cited refer to the data listed in the associated data definition table.

1. ENTITY LIST.

E-E1 P-CUSTOMER

SUMMARY: The P-CUSTOMER entity represents any unit in the model with personnel requirements. A unit becomes a personnel customer (P-CUSTOMER) whenever its personnel inventory must be evaluated or changed (e.g., when the unit is evaluated during the replacement cycle, when newly assigned systems require crews, or when a personnel inventory is needed to determine the unit's ability to perform a task). A P-CUSTOMER ceases to exist when the evaluation process is completed and the requirement is satisfied (e.g., when a unit has received its replacements, it is no longer a customer). A P-CUSTOMER has two actions associated with it: CHANGE EXPECTATIONS (A-CHANGEX), which updates the customer due-in; and TRANSFER PERSONNEL (A-TRANSPER), which moves assigned personnel into the customer inventory. (See diagram, figure E-1.)

ATTRIBUTES:

Unit ID
Unit status
R-POOL ID
Sister unit IDs
Inventories (personnel and weapon system)
Echelon

E-E2 R-POOL

SUMMARY: The R-POOL entity represents any unit (e.g., a replacement-regulating detachment or a replacement detachment) which contains a personnel inventory for the purpose of providing replacements to units. The R-POOL exists as a real unit on the battlefield and as such will have all normal unit attributes. In addition, it will contain an inventory from which the ASSIGN PERSONNEL (A-ASSPER) action obtains personnel to fill customer requirements. An R-POOL obtains personnel for its inventory by becoming a P-CUSTOMER entity and receiving replacements from its designated R-POOL. (See diagram, figure E-2.)

ATTRIBUTES:

Unit ID
Unit status
P-CUSTOMER IDs
Personnel inventory
Echelon

2. ACTION LIST.

E-A1 TRANSFER PERSONNEL (A-TRANSPER)

SUMMARY: The transfer personnel action moves personnel category by category from a holding unit to a receiving unit (e.g., P-CUSTOMER inventory).

ATTRIBUTES:	ASSGN/RQST	ASSGN/RQST ID	
	P-CUSTOMER ID	P-CUSTOMER inventory	
	Allocated Personnel	Holding Unit ID	
GENERATOR:	F-DISPER (E-F3)	F-OLWSR	(E-F8)
	F-CHKCUS (E-F11)		
ENTITY:	P-CUSTOMER (E-E1)		

E-A2 ASSIGN PERSONNEL (A-ASSPER)

SUMMARY: The assign personnel action (A-ASSPER) removes a specified number of a given category of personnel from the R-POOL inventory and places them in an assignment (ASSGN) in a holding unit.

ATTRIBUTES:	R-POOL ID	Holding unit ID	
	ASSGN ID	RQMT remainder	
	R-POOL remainder	Number assigned	
	Category required	Category available	
	R-POOL inventory		
GENERATOR:	F-ALLPER (E-F5)	F-LOCPER	(E-F3)
ENTITY:	R-POOL (E-E2)		

E-A3 CHANGE EXPECTATIONS (A-CHANGEX)

SUMMARY: The P-CUSTOMER is notified of the number and type of replacements to expect. When personnel have been allocated, the assignment (i.e., the number of each category allocated) is recorded in the P-CUSTOMER due-in. When the personnel assignment arrives at the customer unit, the corresponding record is removed from the due-in.

ATTRIBUTES:	P-CUSTOMER ID		ASSGN
	Action indicator (Record or Delete)		
	P-CUSTOMER Due-In		ASSGN ID

GENERATOR:	F-ALLPER	(F-5)	F-PEREP	(E-F1)
	F-DISPER	(E-F3)		

ENTITY:	P-CUSTOMER	(E-E1)

3. ENTITY-ACTION DIAGRAMS AND CROSS-REFERENCE

ENTITY		ACTION	
R-POOL	(E-E1)	A-ASSPER	(E-A2)
P-CUSTOMER	(E-E2)	A-TRANSPER	(E-A1)
		A-CHANGEX	(E-A3)

E-E1

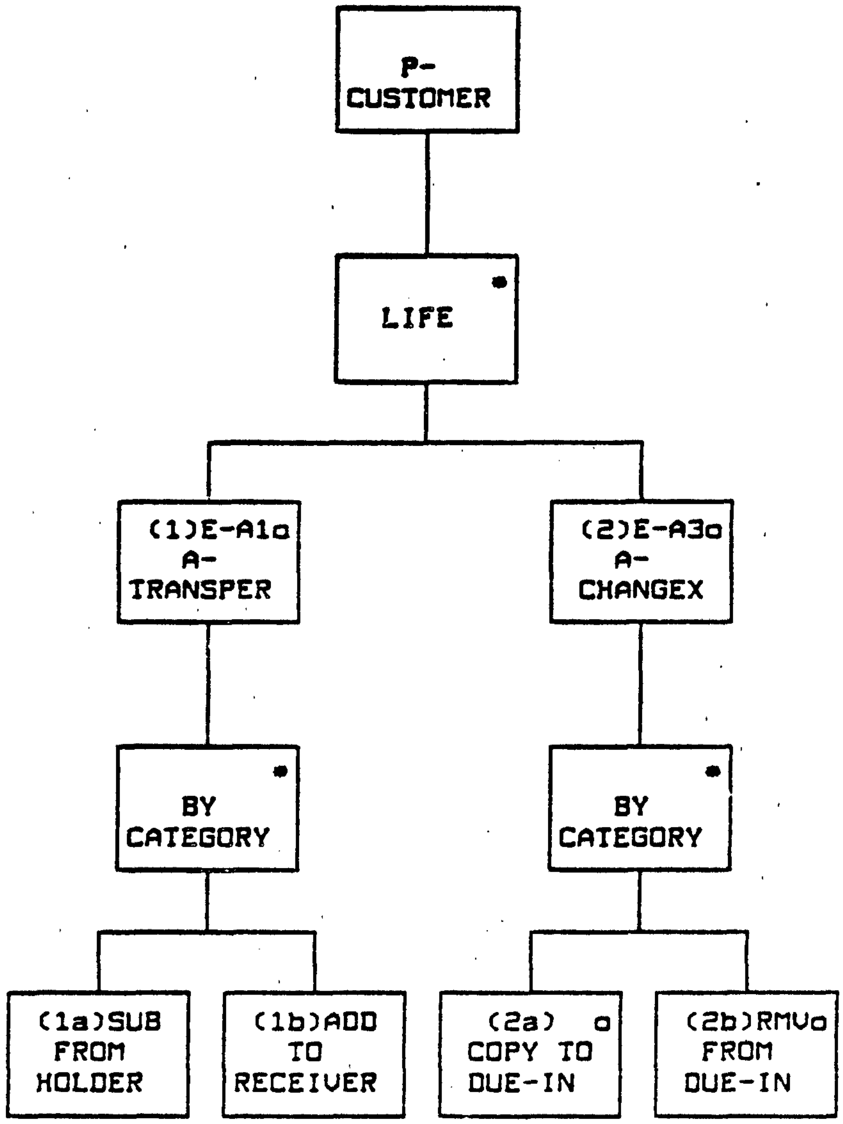

Figure E-1. Entity-action diagram for P-CUSTOMER

Entity-Action Description: P-CUSTOMER (E-E1)

1. <u>TRANSFER PERSONNEL (E-A1)</u>. The transfer personnel action (A-TRANSPER) is selected when it is necessary to remove personnel from their holding unit and add them to a receiving unit. The personnel in question are part of an assignment or request. Information required includes

- o Holding unit ID
- o ASSGN/RQST ID
- o P-CUSTOMER (receiving unit) ID
- o ASSGN/RQST personnel allocated
- o P-CUSTOMER inventory

The assigned personnel are located using the holding unit and ASSGN IDs; the P-CUSTOMER inventory is located using the P-CUSTOMER ID.

a. SUBTRACT FROM HOLDER. The total number in each category of personnel allocated is subtracted from the RQST/ASSGN.

b. ADD TO RECEIVER. The total number subtracted from the RQST/ASSGN is then added to the proper category in the receiving unit inventory.

By the end of the action the ASSGN/RQST has been completely removed from the holding unit and placed in the receiving unit. If the receiving unit is the final customer, the ASSGN ID is then discarded.

2. <u>CHANGE EXPECTATIONS (E-A3)</u>. The change expectations action (A-CHANGEX) is selected when only the record of an assignment must be updated for the P-CUSTOMER. The required information includes:

- o P-CUSTOMER ID
- o ASSGN ID
- o Action indicator
- o P-CUSTOMER due-in

a. COPY TO DUE-IN. The original assignment is copied into the P-CUSTOMER's due-in as a record of the expected number of personnel in each category.

b. REMOVE FROM DUE-IN. When the assignment arrives at the P-CUSTOMER, the record of the assignment is removed from the due-in. The original assignment is removed whether or not the entire assignment has been provided and no attempt is made to reorder personnel.

E-E2

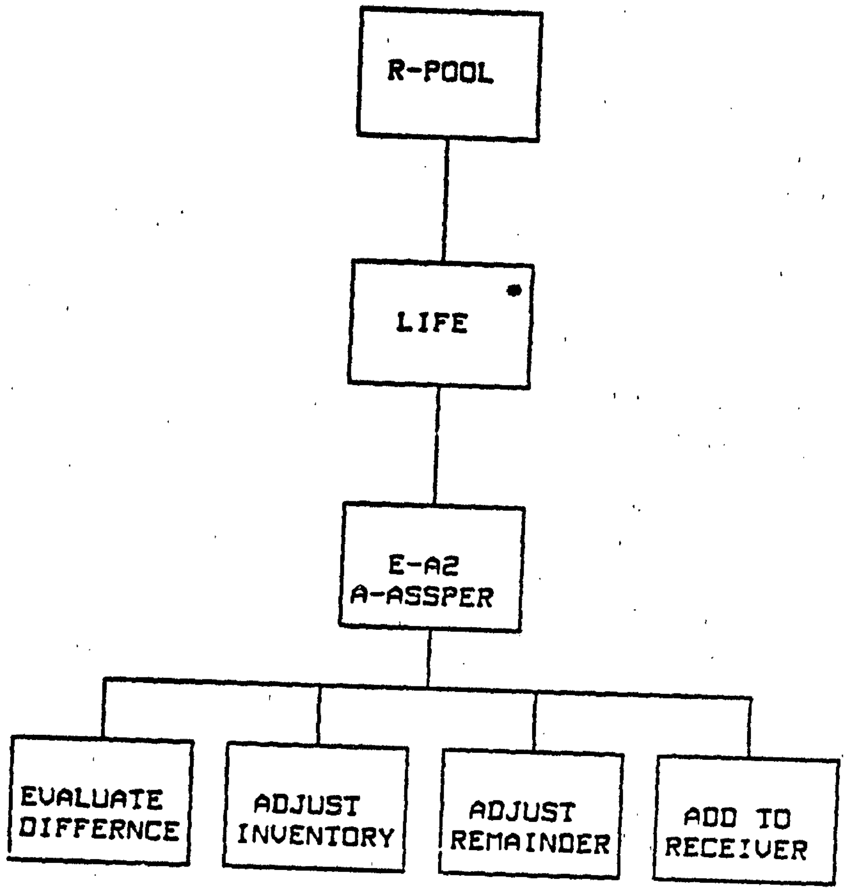

Figure E-2. Entity-action diagram for R-POOL

Entity-Action Description: R-POOL (E-E2)

A-ASSPER (E-A2)

The assign personnel action (A-ASSPER) removes a specified number of personnel from a given personnel category and adds them to a designated category in the assignment (ASSGN). The information required includes:

- R-POOL ID
- Personnel category to be checked
- Personnel category required
- Category number required
- ASSGN ID
- Holding unit ID
- R-POOL inventory

The R-POOL inventory is located using the R-POOL ID and the personnel category specified is checked:

- If the number required is less than or equal to the number available, then the required is subtracted from the available. The required number is added to the assignment, the difference becomes the number remaining in the inventory, and the number remaining in the requirement is zero.

- If the number required is greater than the number available, then the number available is subtracted from the number required. The number available is added to the assignment, the difference becomes the number remaining to be filled, and the number remaining in the inventory is zero.

The action will update the following:

- The number of personnel in the specified category in the R-POOL inventory.
- The number of personnel remaining in the category required.
- The number of personnel added to the required category in assignment (ASSGN).

4. GENERATOR FUNCTION LIST.

E-F1 F-PEREP

SUMMARY: Determines each P-CUSTOMER unit's personnel requirements and attempts to supply appropriate replacements from the replacement unit (R-POOL).

TRIGGERED BY: Timer

RESULTING IN:

A-CHANGEX	(E-A3)	F-ALLPER	(E-F5)
F-LOCPER	(E-F13)	F-CHINV	(E-F4)
F-CREATE-RQST	(C-F1)	F-DIRECT-RQST	(C-F2)
F-DISPER	(E-F3)	Scheduled	
Timer Scheduled			

E-F2 F-WSRQ

SUMMARY: Called when crews are needed to man newly-assigned weapon systems. Checks to see if the request is new or old and invokes the appropriate function to locate personnel. Provides SUPPLY with the number of crews assigned and the RQST status.

TRIGGERED BY: F-ALOC-ORDER (D-F11)
F-NONALOC-ORDER (D-F12)

RESULTING IN: F-NUWSR (E-F7) F-OLWSR (E-F8)

E-F3 F-DISPER

SUMMARY Transfers personnel from a holding unit to a P-CUSTOMER. Checks P-CUSTOMER status for ability to receive personnel and redistributes as necessary.

TRIGGERED BY: F-ATOBJ-GRND (C-F10)
F-ATOBJ-AIR (C-F11)
F-PEREP (E-F1) Scheduled

RESULTING IN:

A-TRANSPER	(E-A1)	A-CHANGEX	(E-A3)
F-ALLPER	(E-F5)	F-FILLWS	(E-F9)
F-TRANSP-DECIDE	(C-F15)		

E-F4 F-CHINV

SUMMARY: Determines the number of manned systems/tasks available and the size of personnel imbalances (excesses and deficiencies) at a P-CUSTOMER unit.

TRIGGERED BY: F-PEREP (E-F1) F-CHKCUS (E-F11)
Any module

RESULTING IN: F-CALPER (E-F6)

E-F5 F-ALLPER

SUMMARY: Separates an entire group of personnel into individual assignments based upon target effectiveness levels listed in the allocation table.

TRIGGERED BY: F-PEREP (E-F1) F-DISPER (E-F3)

RESULTING IN: A-ASSPER (E-A2) A-CHANGEX (E-A3)

E-F6 CALPER

SUMMARY: Determines the categories and number of personnel required to build crews for specified systems.

TRIGGERED BY: F-CHINV (E-F4) F-NUWSR (E-F7)

RESULTING IN: Personnel requirements

E-F7 F-NUWSR

SUMMARY: Creates a crew request (RQST) and attempts to fill it by checking the P-CUSTOMER, the R-POOL, and the P-CUSTOMER's sister units for excess personnel.

TRIGGERED BY: F-WSRQ (E-F2)

RESULTING IN: F-CALPER (E-F6) F-SUPPER (E-F10)
F-ARRCRU (E-F12)

E-F8 F-OLWSR

SUMMARY: Checks to see if the number of crews to be delivered is currently available. If not, checks the P-CUSTOMER and sister units for excess personnel. Builds and transfers crews from RQST to the weapon systems.

TRIGGERED BY: F-WSRQ (E-F2)

RESULTING IN: A-TRANSPER (E-A1) F-ARRCRU (E-F12)
F-CHKCUS (E-F11)

E-F9 F-FILLWS

SUMMARY: Attempts to fill the WS RQSTS remaining in the R-POOL's WSR-Queue.

TRIGGERED BY: F-DISPER (E-F3)

RESULTING IN: F-SUPPER (E-F10) F-ARRCRU (E-F12)

E-F10 F-SUPPER

SUMMARY: Locates personnel to man the systems in a WSRQ event. Obtains personnel from the P-CUSTOMER, the R-POOL, and the P-CUSTOMER's sister units.

TRIGGERED BY: F-NUWSR (E-F7) F-FILLWS (E-F9)

RESULTING IN: F-LOCPER (E-F13) F-CHKCUS (E-F10)

E-F11 F-CHKCUS

SUMMARY: Evaluates a P-CUSTOMER to obtain excess personnel for reassignment.

TRIGGERED BY: F-SUPPER (E-F10) F-OLWSR (E-F8)

RESULTING IN: A-TRANSPER (E-A1) F-CHINV (E-F4)

E-F12 F-ARRCRU

SUMMARY: Builds crews for the specified systems from the available personnel in a RQST.

TRIGGERED BY: F-NUWSR (E-F7) F-OLWSR (E-F8)

RESULTING IN: Formation of crews

E-F13 F-LOCPER

SUMMARY: Locates personnel in the R-POOL inventory to fill a request, category-by-category. If there are not enough personnel in the specified category to satisfy the request, alternative categories, listed in a substitute table, are checked.

TRIGGERED BY: F-PEREP (E-F1) F-SUPPER (E-F10)

RESULTING IN: A-ASSPER (E-A2)

E-F14 F-LOADPER

SUMMARY: When a transporter arrives, it locates the proper personnel assignment (ASSGN) in the R-POOL W-Queue and triggers A-TRANSPER to transfer the personnel from the W-Queue to the transporter. Once the personnel are loaded, F-TRANSP-DECIDE is triggered to let the transporter decide what to do next.

TRIGGERED BY: F-ATOBJ-GND (C-F10) F-ATOBJ-AIR (C-F11)

RESULTING IN: A-TRANSPER (E-A1) F-TRANSP-DECIDE (C-F15)

APPENDIX E

Annex

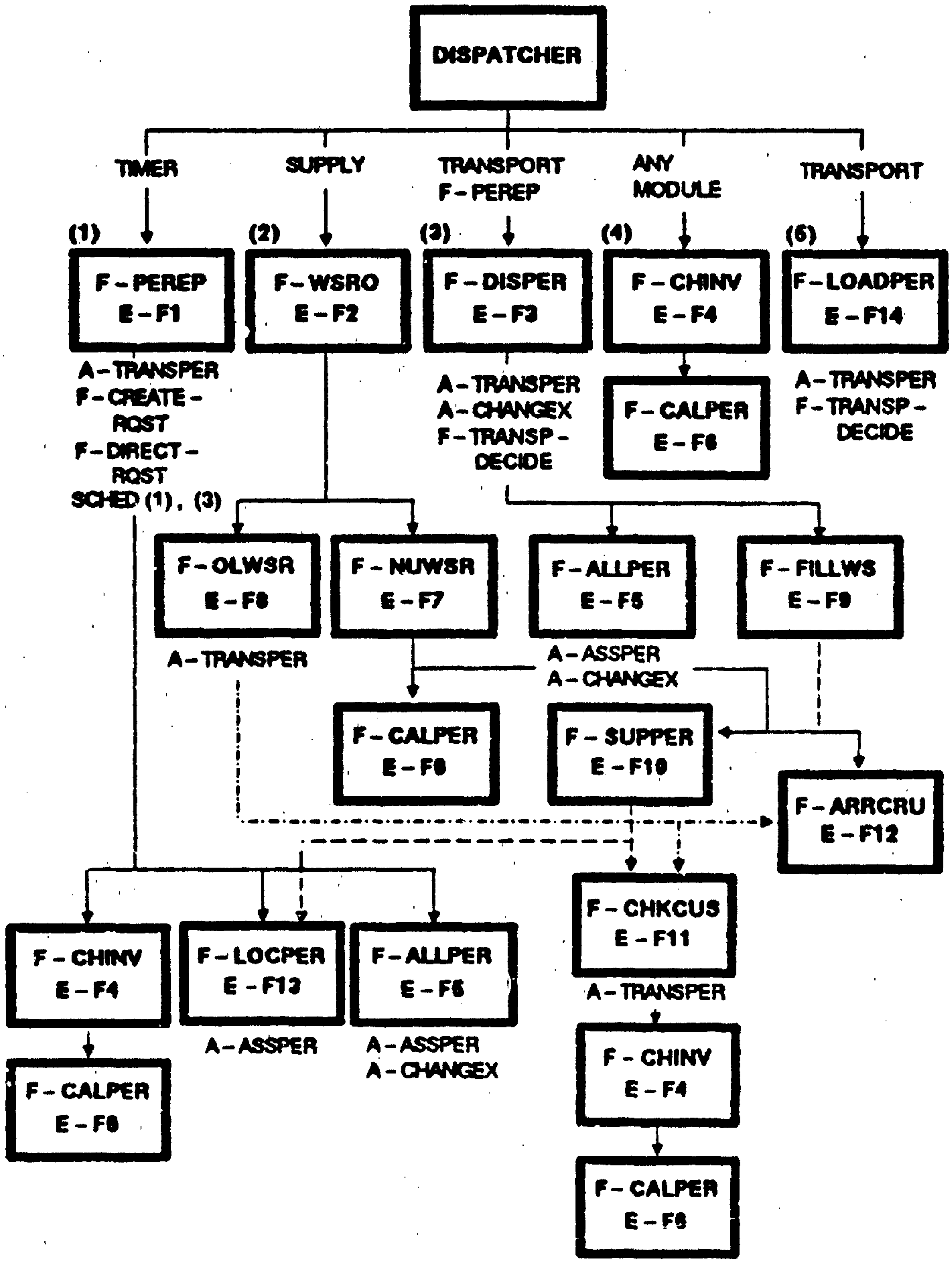

Figure E-3. Personnel operations dispatcher

E-F1 F-PEREP TYPE: Interactive Function

SUMMARY: The periodic replacement function (F-PEREP) determines each P-CUSTOMER's unit personnel requirements and attempts to supply appropriate replacements from the replacement unit (R-POOL). The R-POOL's periodic demand is calculated by determining each P-CUSTOMER's current shortfall. The P-CUSTOMERs are assigned replacements from the current R-POOL inventory and transportation is arranged. The R-POOL demands are accumulated and, at the end of the cycle, the accumulated demand is placed in a theater replacement queue (T-Queue) to become a future allocation of replacements to the corps.

TRIGGERED BY: A Timer

RESULTING IN:

P-CUSTOMER		
A-TRANSPER	(E-A1)	
F-CHINV	(E-F4)	
F-ALLPER	(E-F5)	
F-LOCPER	(E-F13)	
F-DISPER	(E-F3)	Scheduled
F-CREATE-RQST	(C-F1)	Transportation
F-DIRECT-RQST	(C-F2)	Transportation
Timer		Scheduled

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-4.

E-F1

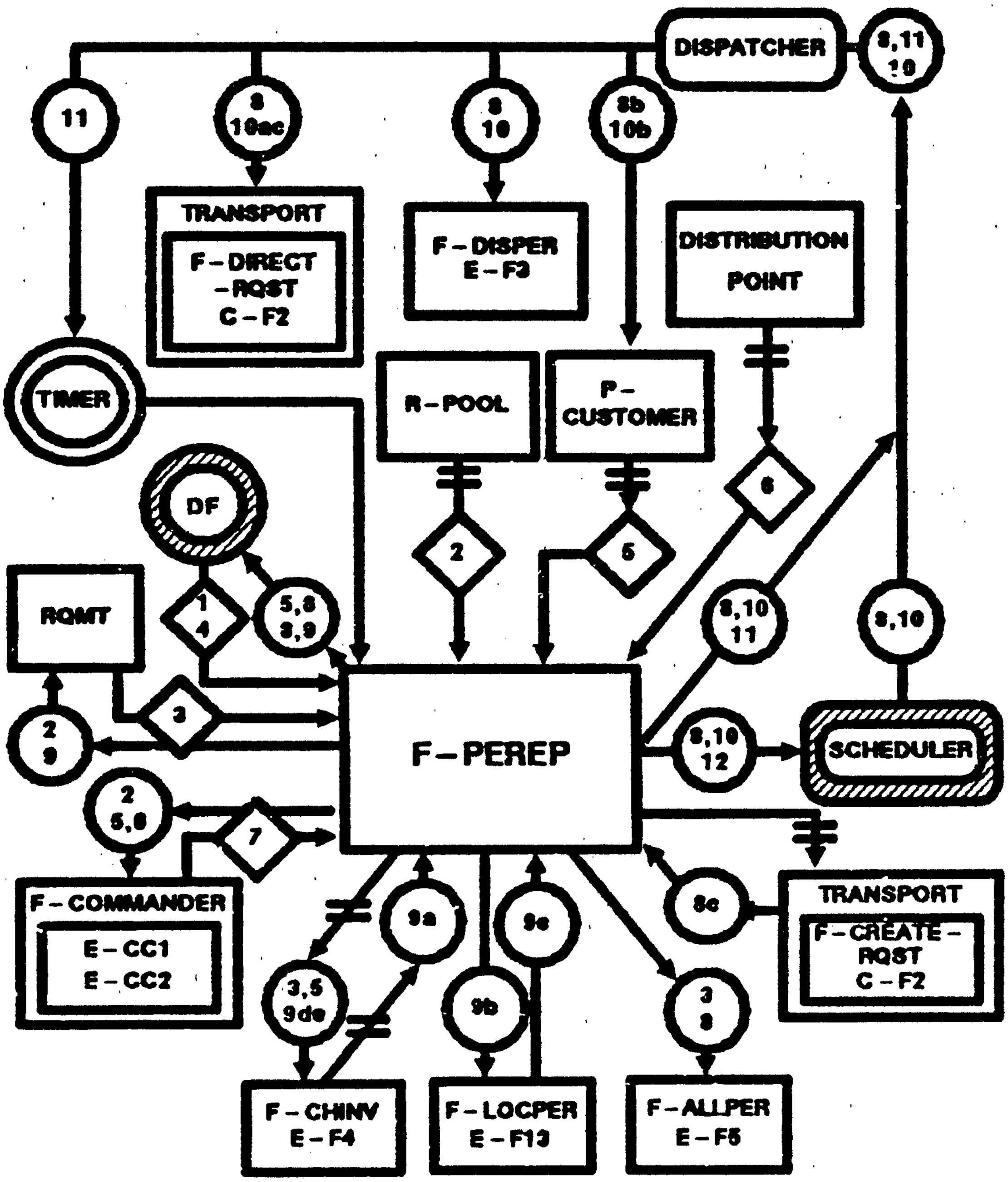

Figure E-4. F-PEREP SSD

E-F1

DATA DEFINITION: F-PEREP

Connection Number	Data Transferred	Comments
D1a	o R-POOL list	An ordered list of R-POOL unit IDs (E-DF2).
D1b	o Weapon system-crew table	A table showing the maximum and minimum number of each personnel category needed for each crew/task type (E-DF1).
D1c	o R-POOL demand	The total personnel requirements placed upon an R-POOL in one cycle (E-DF7).
D1d	o Accumulated demand	The total R-POOL demands for the current period (E-DF7).
D1e	o Standard inventory table	A table providing the maximum number of each category of personnel to be held by each type of noncombat unit (E-DF6).
D1f	o T-Queue	A queue of corps personnel allotments (E-DF7).
D1g	o T-Queue ceilings	A table of the maximum personnel levels of each category available at one time at the theater level (E-DF11).
D1h	o Distribution points	A table showing the distribution point for each potential customer unit (E-DF3).
S2	o R-POOL state vector	
	o P-CUSTOMER IDs	The IDs of the units being serviced by the R-POOL.

DATA DEFINITION: F-PEREP (cont.)

Connection Number	Data Transferred	Comments
S2 cont.	o R-POOL status	A flag showing if a unit is active or inactive.
	o R-POOL echelon	The R-POOL location needed to determine the type of transportation.
D3	o RQMT	E-DF10. A structure initialized at the start of an R-POOL evaluation to hold the following:
	o P-CUSTOMER IDs	The unit IDs of the customer units.
	o P-CUSTOMER shortfall	The number of each type of personnel required by each customer unit (9a).
	o Total shortfall	The total personnel requirement on the R-POOL during the current evaluation (9b).
	o Assigned personnel	The personnel, by category, removed from the R-POOL inventory to meet the requirement (9c).
D4	o W-Queue	E-DF8. A structure associated with an R-POOL which holds personnel assignments awaiting delivery.
	o ASSGN ID	The assignment ID no.
	o Distribution point ID	The location where the assignment will be sent.

DATA DEFINITION: F-PEREP (cont.)

Connection Number	Data Transferred	Comments
D4 cont.	o P-CUSTOMER IDs	The units listed in the RQMT, whose personnel will be delivered to the distribution point.
	o P-CUSTOMER shortfall	The number of each type of personnel required by each unit in the assignment. (9a)
	o Allocated personnel	The number of each type assigned to a customer.
	o Distribution count	The total number in each personnel category to be transported to a distribution point.
	o Mode of transportation	The type of transport to be used: implicit or explicit.
S5	o P-CUSTOMER state vector	
	o P-CUSTOMER ID	The unit ID.
	o Personnel inventory	The personnel in each category currently available to the unit.
	o Unit status	A flag showing if the unit is inactive or active (e.g.,I-M-DEAD).
	o Personnel due-in	The customer's record of the personnel allocated in a given assignment.
	o Unit opcode, function code	Codes used to determine personnel category priorities, inventory requirements, and delivery delay periods.

DATA DEFINITION: F-PEREP (cont.)

Connection Number	Data Transferred	Comments
S6	o Distribution point state vector	
	o Distribution point ID	The unit ID.
	o Echelon	The unit location, needed to determine the mode of transportation.
D7	o Delivery dalay table	A table giving delay times based on location, time of day, weather and road conditions (E-CC2).
	o Personnel category priority list	A list of categories showing the order in which requirements are to be filled (E-CC1).
D8a	o R-POOL ID	The unit ID of the R-POOL to be evaluated.
D8b	o ASSGN ID	The number assigned to identify the assignment (by distribution point and time period).
D8c	o Transportation flag	A flag returned from F-CREATE-ROST (C-F1) indicating mode of transportation.
D9a	o P-CUSTOMER shortfall	The number of each personnel category required by the customer unit (obtained from F-CHINV (E-F4).
D9b	o Total shortfall	The number in each category required during the current R-POOL evaluation.

DATA DEFINITION: F-PEREP (cont.)

Connection Number	Data Transferred	Comments
D9c	o Assigned personnel	The total number of each category of personnel removed from the R-POOL inventory and held in the RQMT for allocation.
D9d	o Required response	The type of information needed from F-CHINV (e.g., total inventory, excess personnel, shortfall).
D9e	o Required systems	The systems to be checked by F-CHINV.
D10a	o Distribution count	The number of personnel to be transported to a given distribution pnt.
D10b	o Due-in	The number and type of personnel allocated to the unit in the ASGN by (A-CHANGEX).
D10c	o Distribution point ID	From D4.
D10d	o Transportation mode	From D4.
D11	o Timer flag	The timer flag (reset it to start a new cycle).
D12	o Delay time	The amount of time designated by the delivery delay table (D7) for an implicit delivery.

E-F1

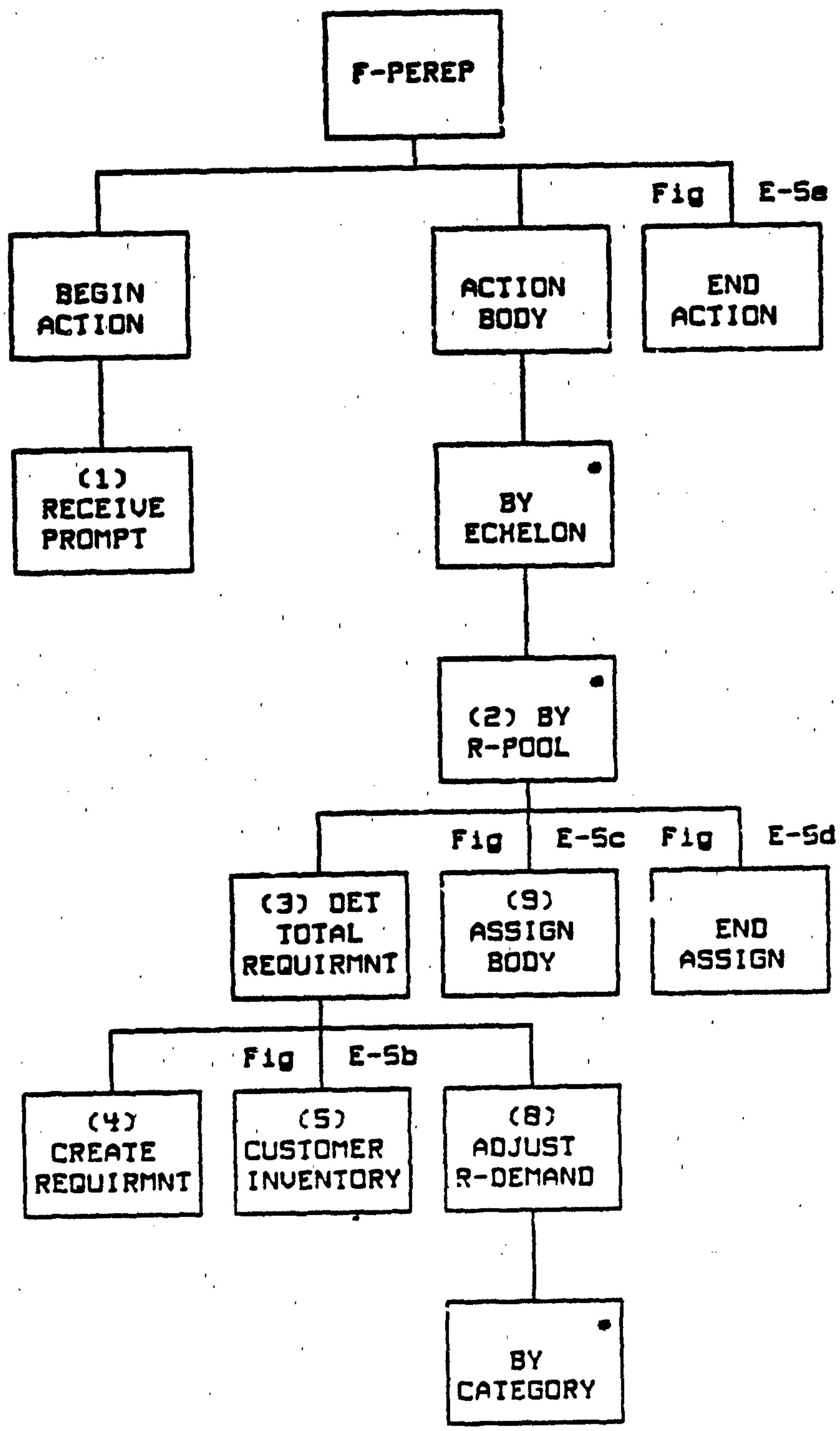

Figure E-5a. F-PEREP generator

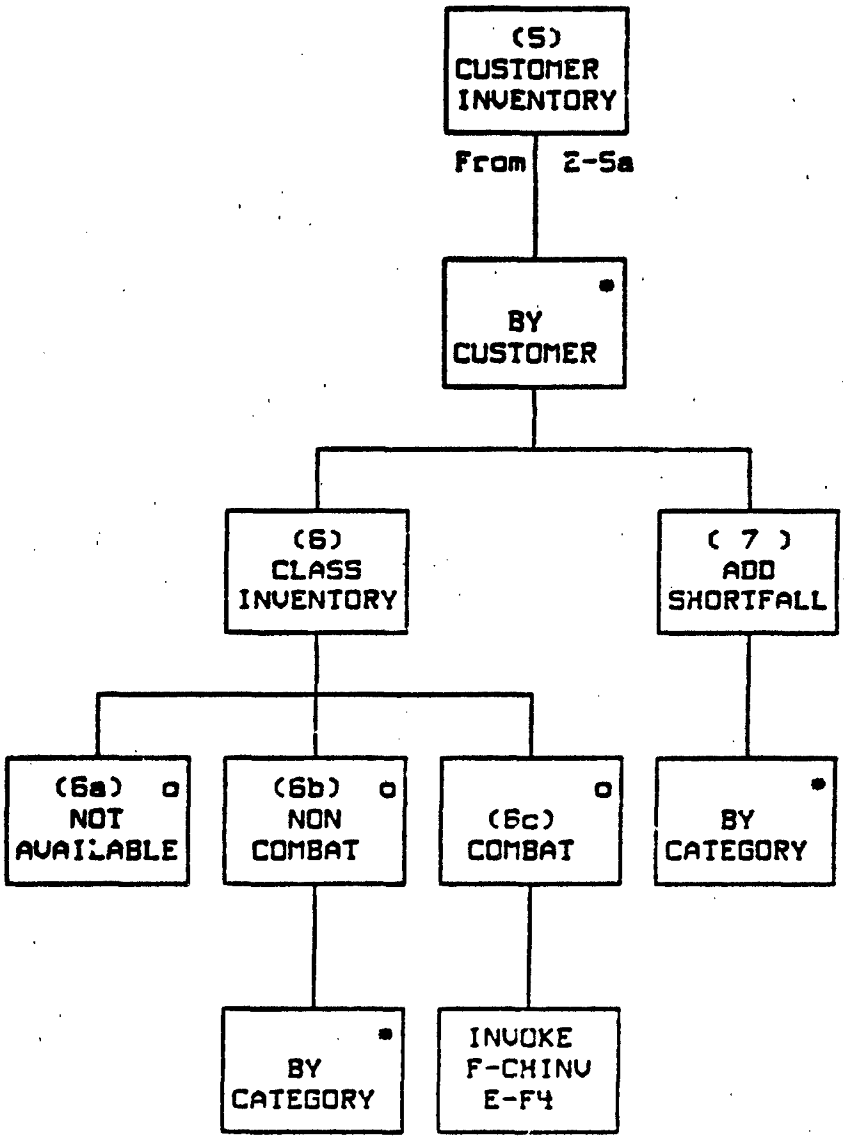

Figure E-5b. F-PEREP generator (continued)

E-F1

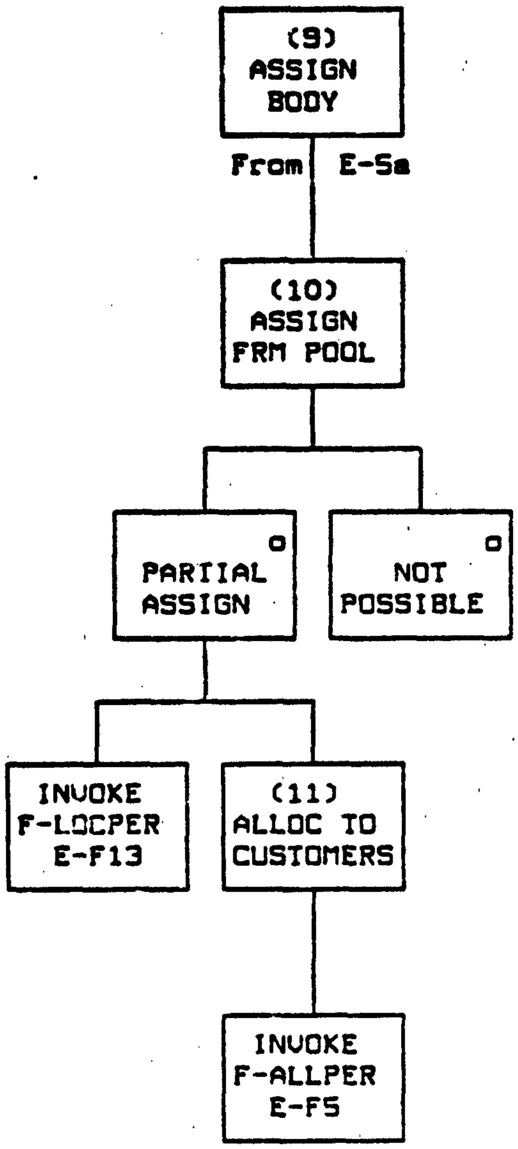

Figure E-5c. F-PEREP generator (continued)

E-F1

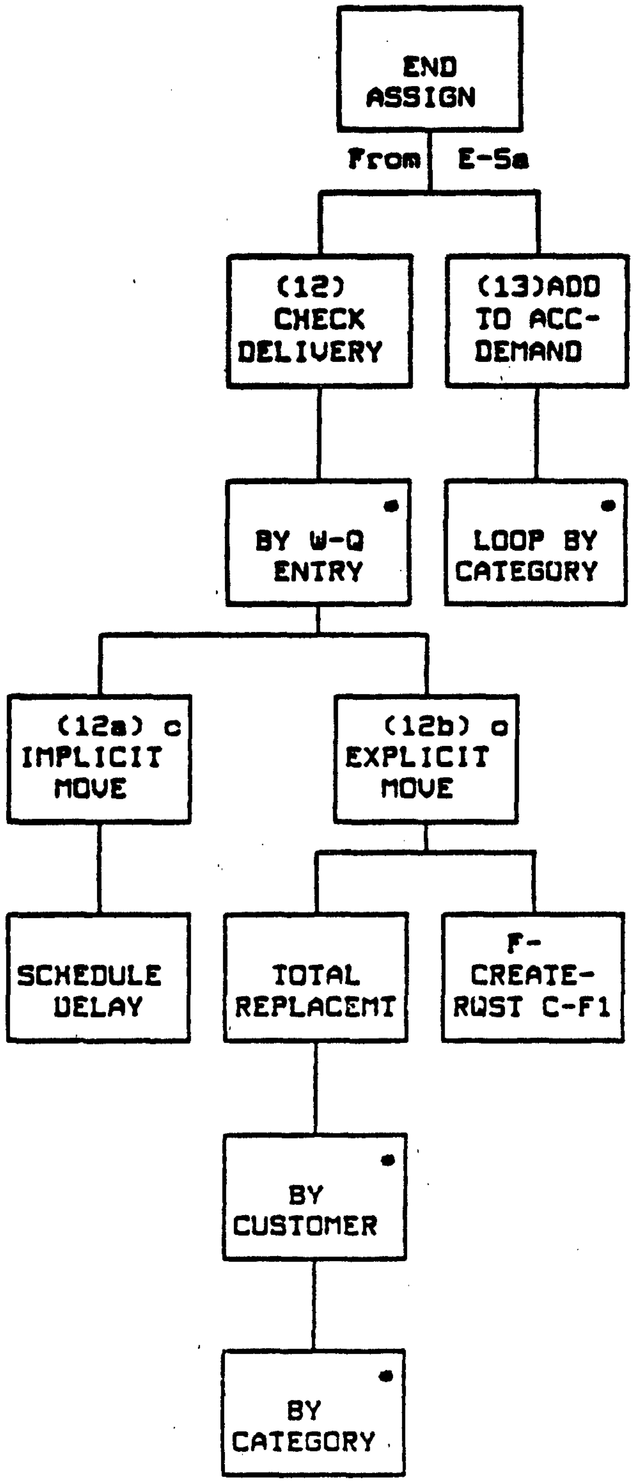

Figure E-5d. F-PEREP generator (continued)

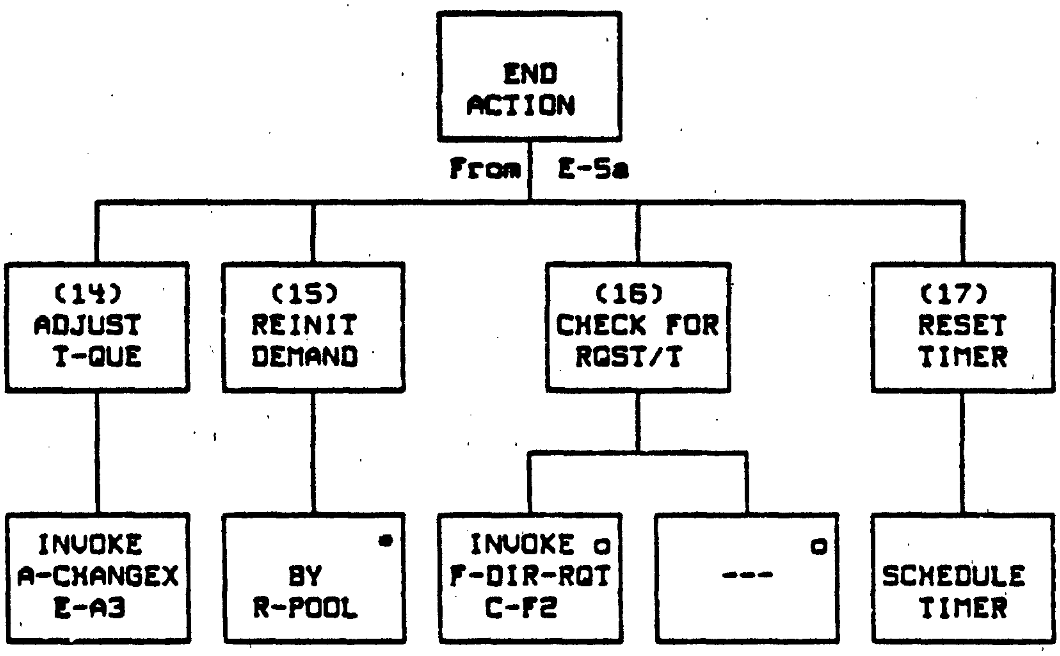

Figure E-5a. F-PEREP generator (continued)

E-F1

GENERATOR DESCRIPTION: F-PEREP

1. RECEIVE PROMPT. The TIMER invokes F-PEREP. The R-POOL list is obtained from the data file (D1a) by request.

2. IDENTIFY R-POOL. F-PEREP selects the next R-POOL on the list (D1a).

3. DETERMINE TOTAL REQUIREMENT. The P-CUSTOMERs belonging to the R-POOL (S2) are evaluated in turn to determine the number and type of personnel required (D9a).

4. INIT RQMT. The RQMT (D3), where the shortfall and assignments will be collected, is initialized.

5. CUSTOMER INVENTORY. Each customer inventory (S5) is evaluated separately, and the customer ID and shortfall are entered into the RQMT (D3).

6. CLASSIFY P-CUSTOMER INVENTORY. Personnel inventories are classified by how their shortfall is to be evaluated. The inventory for combat unit is evaluated in terms of its weapon effectiveness. The inventories of other units, such as medical and maintenance, are compared with the appropriate entries in the standard inventory table (D1e). An R-POOL's personnel shortfall consists of its most recent demand (D1c). The unit code (S5) is used to determine which classification to select.

a. NOT AVAILABLE. A P-CUSTOMER with dead/inactive status (S5) is considered unable to receive personnel and will not be evaluated.

b. NON-COMBAT. An R-POOL's shortfall is obtained directly from the R-POOL demand (D1c). Other noncombat units determine their shortfall by comparing inventories with the appropriate standard inventory (D1e).

c. COMBAT UNITS. The shortfall at a combat unit is determined by invoking F-CHINV to evaluate weapon effectiveness. Information required includes the customer ID (S2), the weapon systems to be evaluated (in this case, all systems at the unit), the information to be returned (in this case, customer shortfall), and the location in which to store it (RQMT D3).

7. ADD SHORTFALL. Each P-CUSTOMER's shortfall is added, by category, to the total shortfall for the R-POOL (D9a, b).

8. ADJUST R-DEMAND. When all P-CUSTOMERs have been evaluated, the total shortfall (D9b) is added to the R-POOL demand (D1c).

F-PEREP (cont.)

9. ASSIGN BODY. The R-POOL is checked to guarantee that the process of assignment is possible. The personnel category priorities are checked (D7) and arranged in order.

10. PARTIAL ASSIGN. The locate personnel function (F-LOCPER) is performed in order to locate appropriate replacements in the R-POOL inventory. The total shortfall (D9b) is passed to the routine and matches or substitutes are assigned from the R-POOL inventory (S2). The number of replacements assigned (D9c) in each required category is returned to the RQMT (D3).

11. ALLOCATE PERSONNEL. The allocate personnel function (F-ALLPER) is invoked to distribute the assigned personnel among the P-CUSTOMERs. (If the total assigned in a category from the R-POOL equals the total required, each P-CUSTOMER receives the exact number needed. If the total assigned is less, then F-ALLPER accesses the allocation table to determine how to distribute the available personnel. The values in the table are based on unit opcode and function code and represent the lowest level of effectiveness deemed acceptable for the unit. They may be changed by gamer intervention or by situation.) The input parameters needed by F-ALLPER are the R-POOL ID (D8a), the ASSGN ID (D4), and the distribution point ID (D1h). The resulting output will be the assignments contained in the W-Queue (D4).

12. CHECK DELIVERY. Personnel assignments (D9c) are stored in the W-Queue by distribution point and P-CUSTOMER IDs (D4). Transportation for each ASSGN is determined by comparing the distribution point's echelon (S6) with that of the R-POOL (S2).

a. IMPLICIT MOVE. If the distribution point is in the same echelon, a delay time (D12) is scheduled using the delivery delay table (D7).

b. EXPLICIT MOVE. If the distribution point is in a different echelon, the total number of replacements is calculated (D10) and stored in ASSGN (D4) and F-CREATE-RQST (C-F1) is triggered. (F-CREATE-RQST is a transportaiton routine which will determine whether transportation assets will be used to transport the replacements. It will return a flag indicating the mode of transportation to be used.)

13. ADD TO ACCUMULATED. The R-POOL demand (D1c) is added to the accumulated demand (D1d).

F-PEREP (cont.)

14. ADJUST THEATER QUEUE. When all R-POOLs have been polled, the accumulated demand will represent the total current request from corps. For each category, the accumulated demand is compared to the ceiling allowed (D1g) and the lower of the two is placed in the theater queue (T-Queue, D1f) using A-CHANGEX (E-A3) to become a future corps personnel allotment.

15. REINITIALIZE R-POOL DEMAND. At the end of the cycle, the R-POOL demands (D1c) are reinitialized to begin the next cycle.

16. CHECK TRANSPORTATION. The transportation flag (step 12b) is checked and, if any request for transportation has been created, F-DIRECT-RQST (C-F2) is invoked (D8, D10ac).

17. RESET TIMER. The timer is reset for 24 hours (D11) and the periodic replacement process ends.

E-F2 F-WSRO TYPE: Interactive Function

SUMMARY: The F-WSRO function is called by SUPPLY when crews are needed to man weapon systems. F-WSRO checks to see if the request is new or old and invokes the appropriate function to locate personnel. When crews are formed, F-WSRO checks to see if the request has been satisfied and provides SUPPLY with the number of crews assigned and the ROST status.

TRIGGERED BY: F-ALLOC-ORDER (D-F14) Supply

RESULTING IN: SUPPLY ROST status update
F-NUWSR (E-F7)
F-OLWSR (E-F8)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See Figure E-6.

E - F2

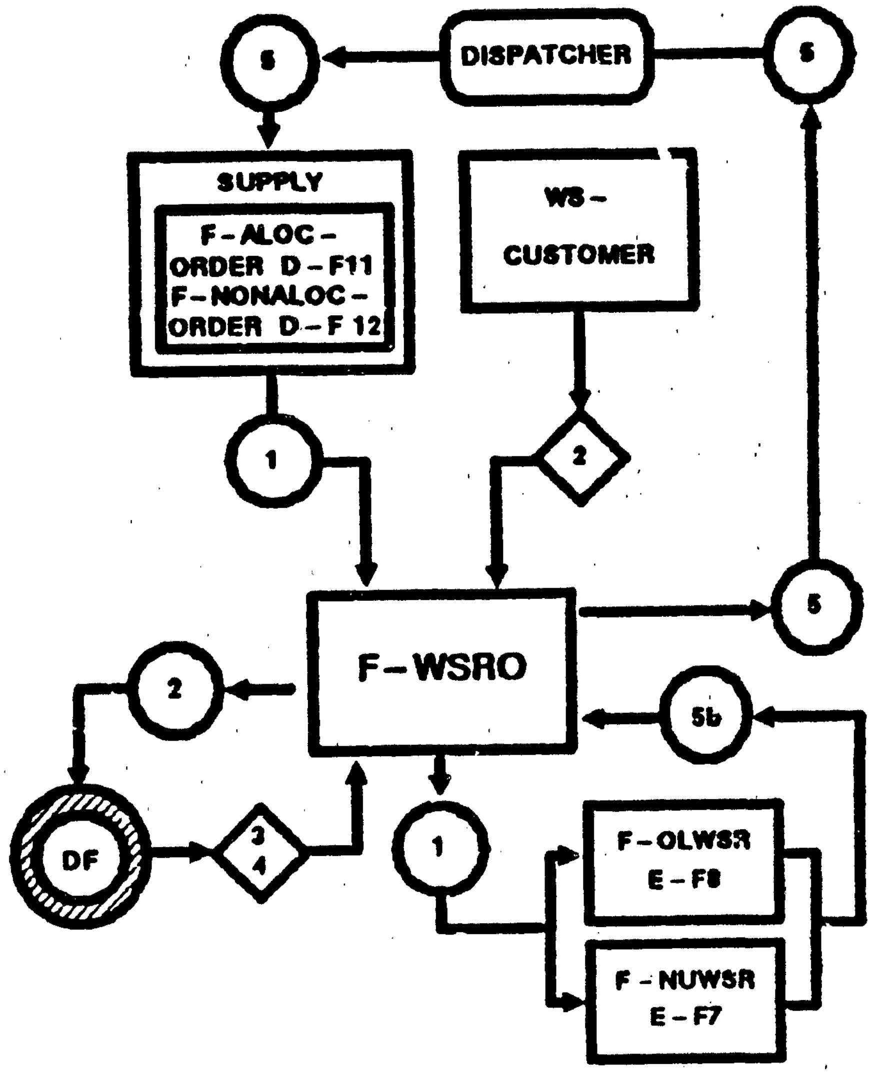

Figure E-6. F-WSRO SSD

DATA DEFINITION: F-WSRO

Connection Number	Data Transferred	Comments
D1	o RQST ID	Allocation ID from supply.
	o WS-Customer ID/ Distribution point ID	Either the ID of the unit to receive the manned system or the location to which the crews should be delivered is passed, depending upon whether the RQST is new or old.
	o Systems required/ Systems requested	The type and quantity of systems to be manned. If the RQST is new, the total number of systems required is passed; if the RQST is old, the number of systems to be manned immediately (i.e., some portion of the original RQST) is passed.
S2	o WS-Customer/distribution point state vector	
	o R-POOL ID	The ID of the R-POOL assigned to the specified unit (customer or distribution pt) is needed to locate the WSR-Queue.
D3	o WSR-Queue	The RQST holder (E-DF9).
	o RQST ID	The allocation number.
	o WS-Customer ID	The ID of the unit to receive the systems.

DATA DEFINITION: F-WSRO (cont.)

Connection Number	Data Transferred	Comments
D4a	o R-POOL demand	The total number of each category of personnel requested from the R-POOL during the current period (E-DF7).
D4b	o WSR-Queue ID	The ID of the weapon system request (WSR) queue associated with the R-POOL (E-DF9).
D5a	o RQST status	A flag designating whether the RQST is filled or not.
D5b	o Crews supplied/sent	The number of full crews of each type available to the RQST or the number of crews sent to supply.

E-F2

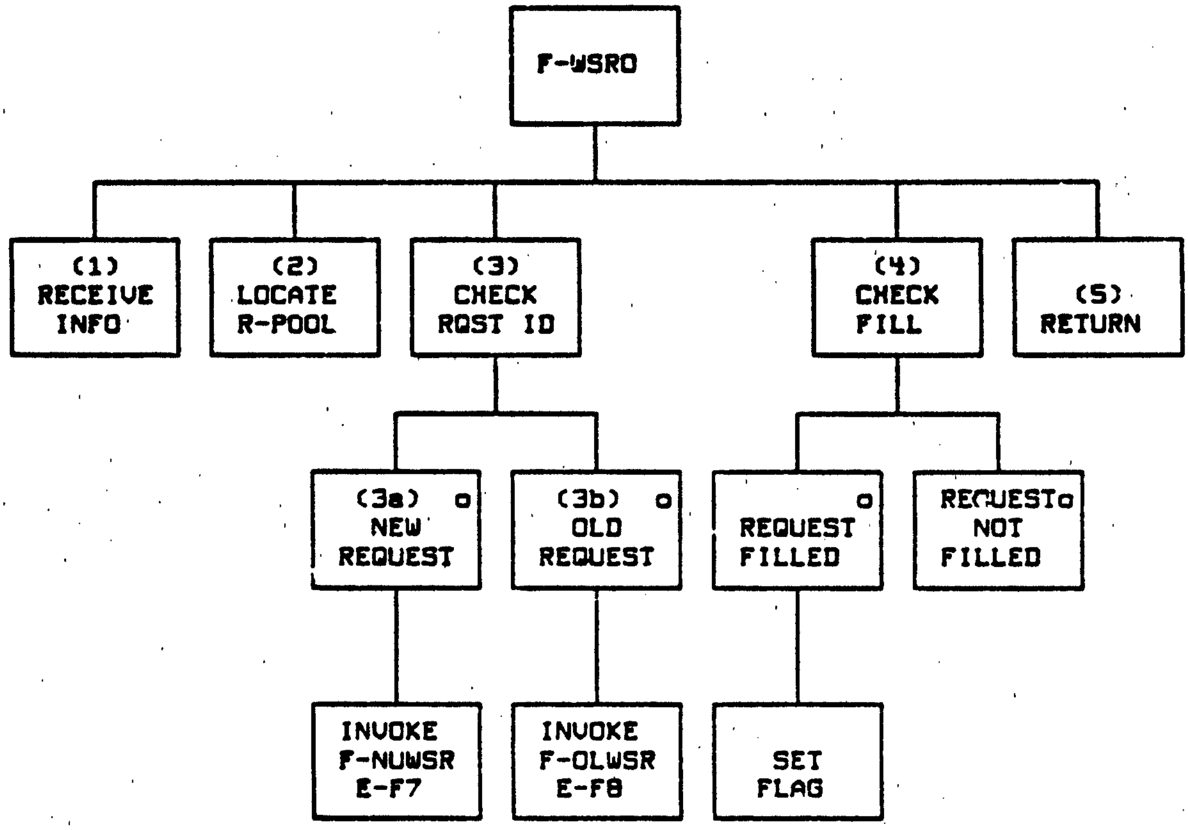

Figure E-7. F-WSRO generator

E-F2

GENERATOR DESCRIPTION: F-WSRO

1. RECEIVE INFORMATION. The calling routine (D-F11 or D-F12) passes the RQST ID (allocation ID), P-CUSTOMER or distribution point ID, and the number and type of systems involved (D1).

2. LOCATE R-POOL. The R-POOL ID is obtained from the P-CUSTOMER or distribution point (S2) and is used to locate the temporary RQST holder (WSR-Queue, D4b).

3. CHECK RQST-ID. The WSR-Queue (D3) is checked to see if the RQST ID is already listed.

a. NEW RQST. If a RQST is new, the RQST ID, WS-Customer ID, and required systems (D1) are entered into the WSR-Queue. F-NUWSR (E-F7) is invoked using the WSR-Queue ID (D4b) and the elements in D1 as parameters. F-NUWSR determines the number and type of personnel required to fill the RQST are calculated, begins the process of filling it, and returns the number of crews available (D5b) to F-WSRO.

b. OLD RQST. Old RQSTs are handled by invoking F-OLSWR (E-F8) using the elements in D1 and the WSR-Queue ID (D4b). The current call from supply requests that a portion of the original RQST be sent (D1) and F-OLWSR attempts to fill this portion by sending the appropriate allocated personnel (D3) to the distribution location (D1) and by returning the number of crews supplied to F-WSRO (D5b).

4. CHECK FILL. The RQST is checked to see if it has been filled by comparing the number of systems required to the number of crews assigned (D3). If they are equal, the RQST status flag (D5a) is set.

5. RETURN. The number of crews available or supplied and the RQST status (D5) are returned to the calling routine.

E-F3 F-DISPER TYPE: Interactive Function

SUMMARY: Personnel can either be transferred to a receiving unit implicitly or can be transported by a convoy. When transported by convoy, the personnel for several P-CUSTOMERs are carried to a joint distribution point for further implicit distribution. When transported implicitly, personnel will be subtracted from the holding unit and added to the receiving unit following a delay. The F-DISPER routine checks for distribution modifications caused by P-CUSTOMER status changes, holding unit attrition, or new command decisions. Any necessary redistribution is done by F-ALLPER. Personnel are transferred to the P-CUSTOMER by the transfer personnel action (A-TRANSPER). The P-CUSTOMER unit effectiveness measures are updated and the due-ins are adjusted by the change expectations action (A-CHANGEX). When the P-CUSTOMER unit is an R-POOL personnel inventory, the F-FILLWS function is invoked to fill any unsatisfied weapon system requests on the pool.

TRIGGERED BY:	F-ATOBJ-GND	(C-F10)	Transportation
	F-ATOBJ-AIR	(C-F11)	Transportation
	A timer scheduled by F-PEREP (E-F1)		
RESULTING IN:	P-CUSTOMER		
	A-CHANGEX	(E-A3)	
	A-TRANSPER	(E-A2)	
	F-FILLWSR	(E-F9)	
	F-ALLPER	(E-F5)	
	F-TRANSP-DECIDE	(C-F15)	Transportation
	Updated effectiveness scores		

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-8.

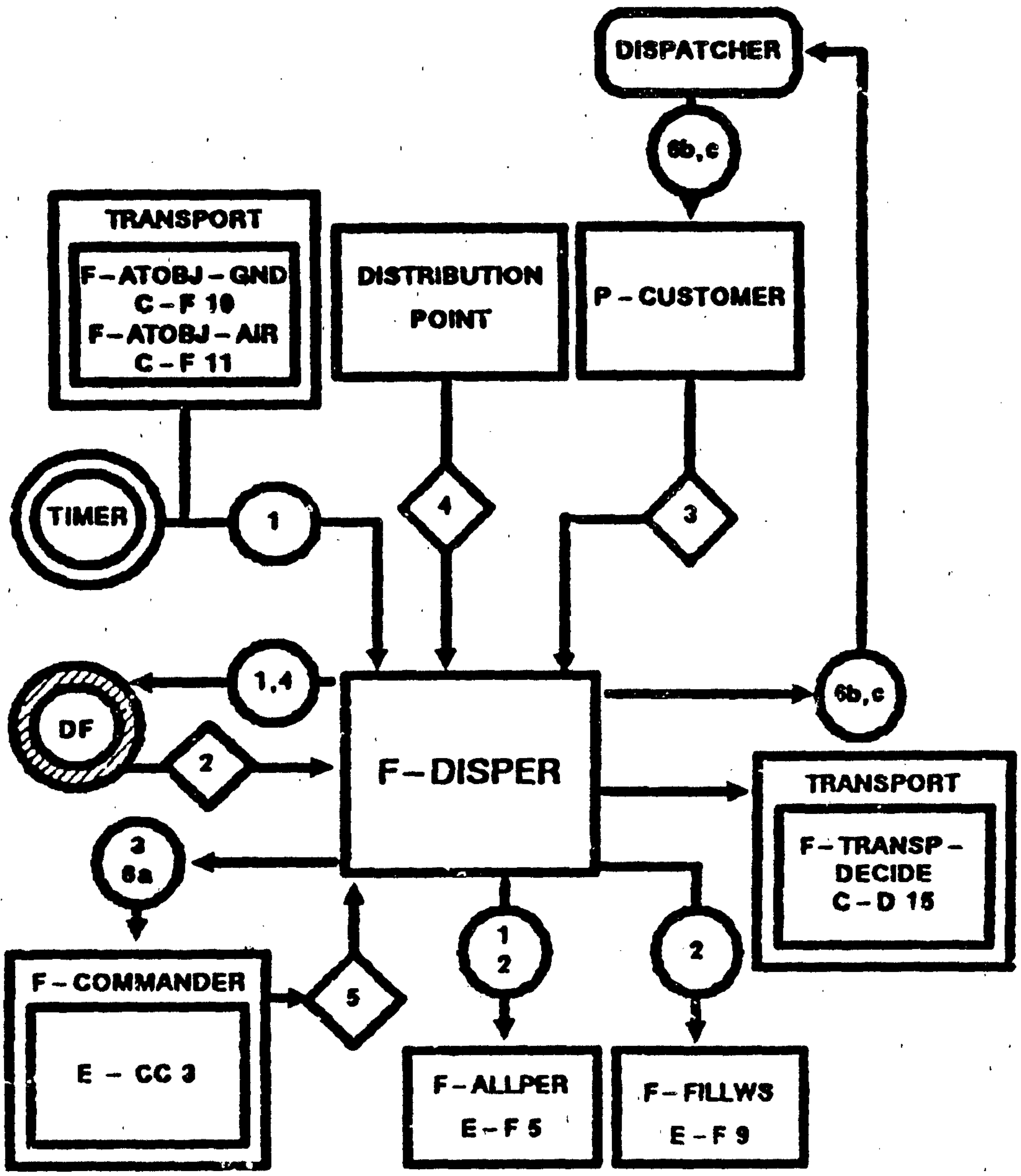

Figure E-8. F-DISPER SSD

DATA DEFINITION: F-DISPER

Connection Number	Data Transferred	Comments
D1	o Holding unit ID	The unit currently holding the personnel.
	o ASSGN ID	The assignment identifier.
	o Assigned personnel	The personnel being delivered.
	o Distribution point ID	The unloading location: (e.g., the brigade).
	o Transportation mode	Explict/implicit.
D2	o T-ASSGN	A temporary holding unit containing the following elements (E-DF10):
	o ASSGN ID	
	o T-ASSGN ID	
	o P-CUSTOMER IDs	The IDs of the units requiring personnel.
	o P-CUSTOMER shortfall	The personnel requirements of a unit.
	o P-CUSTOMER allocation	The number of each category assigned to fill a P-CUSTOMER's requirement.
	o Total count	The number of each type of personnel contained in the holding unit's inventory.
	o Temporary inventory	Location holding personnel for redistribution.

E-F3

DATA DEFINITION: F-DISPER (cont.)

Connection Number	Data Transferred	Comments
S3	o P-CUSTOMER state vector	
	o Unit status	A flag showing if the customer is alive/active or dead/inactive (e.g., an I-M-DEAD flag).
	o P-CUSTOMER due-in	The number and type personnel assigned to and expected by the customer.
	o P-CUSTOMER inventory	The unit personnel, separated into categories.
	o R-POOL ID	
	o Unit opcode, Unit function code	Possible parameters for the allocation table.
S4	o Distribution point state vector	
	o R-POOL ID	
D5	o CC flag	A flag set when assigned personnel are to be redistributed (E-CC3).
D6a	o Set/reset flag prompt	A message sent to F-COMMANDER changing the CC flag status.
D6b	o ASSGN ID	From D2.
D6c	o Personnel allocation	From D2.

E-F3

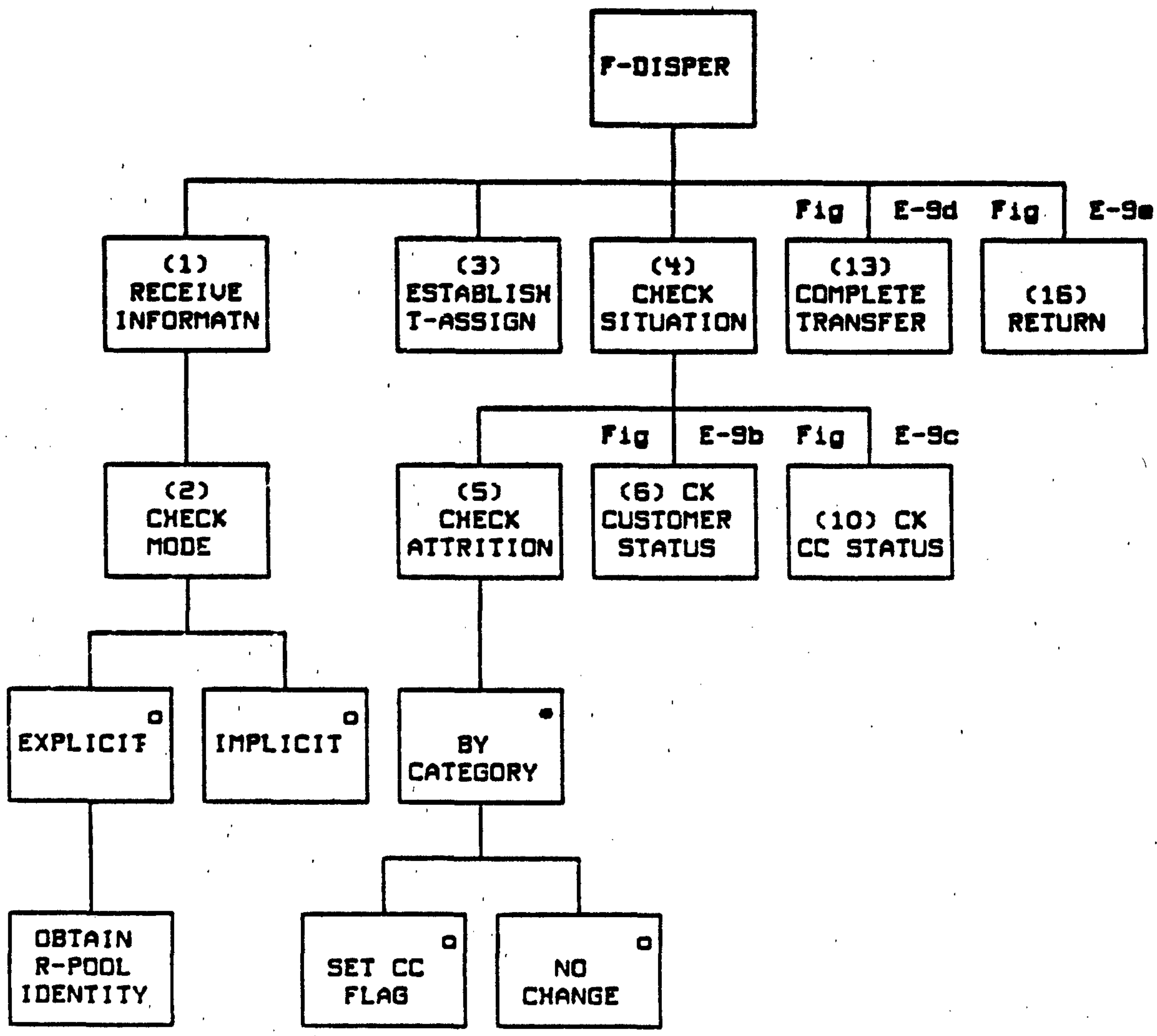

Figure E-9a. F-DISPER generator

E-F3

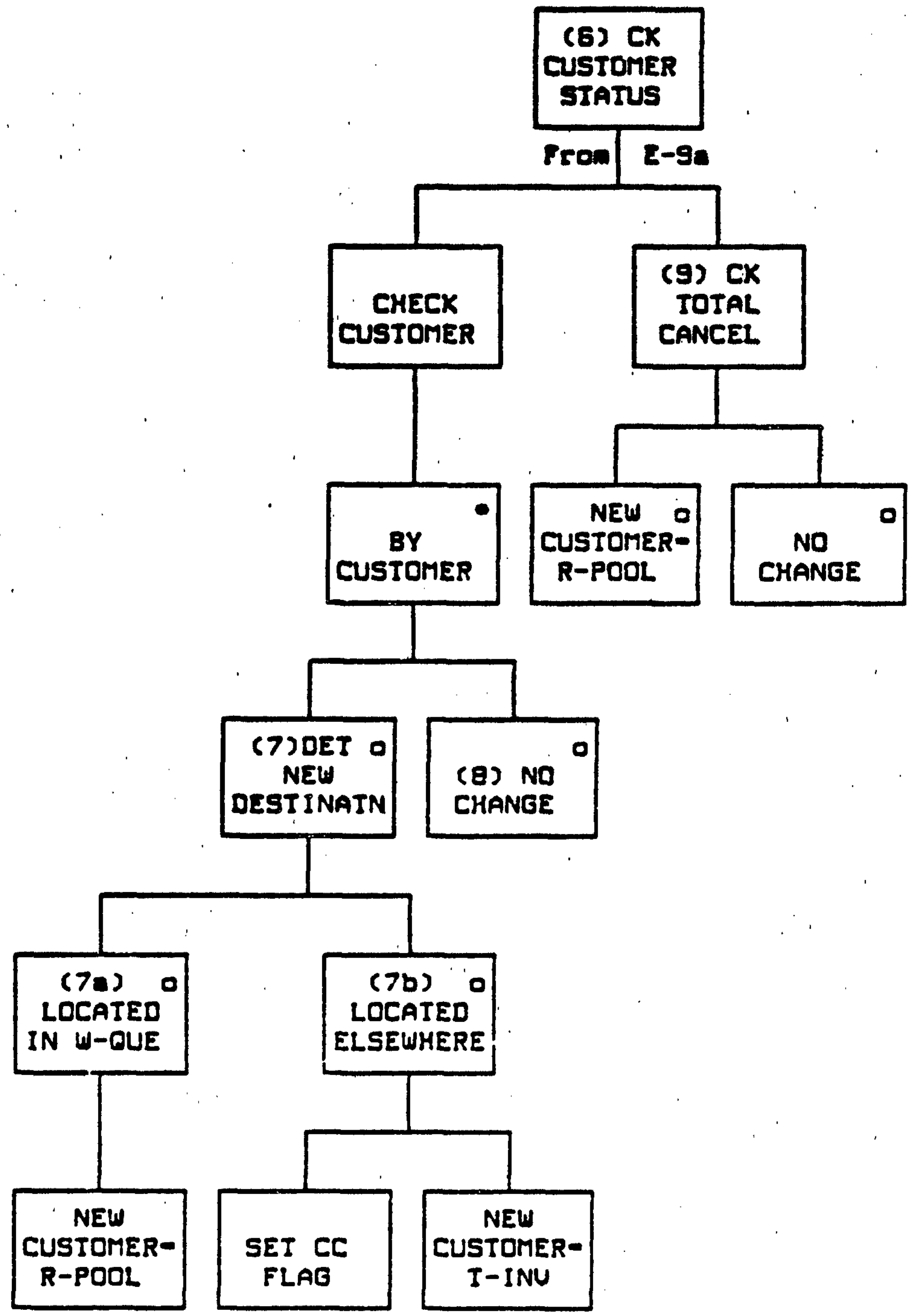

Figure E-9b. F-DISPER generator (continued)

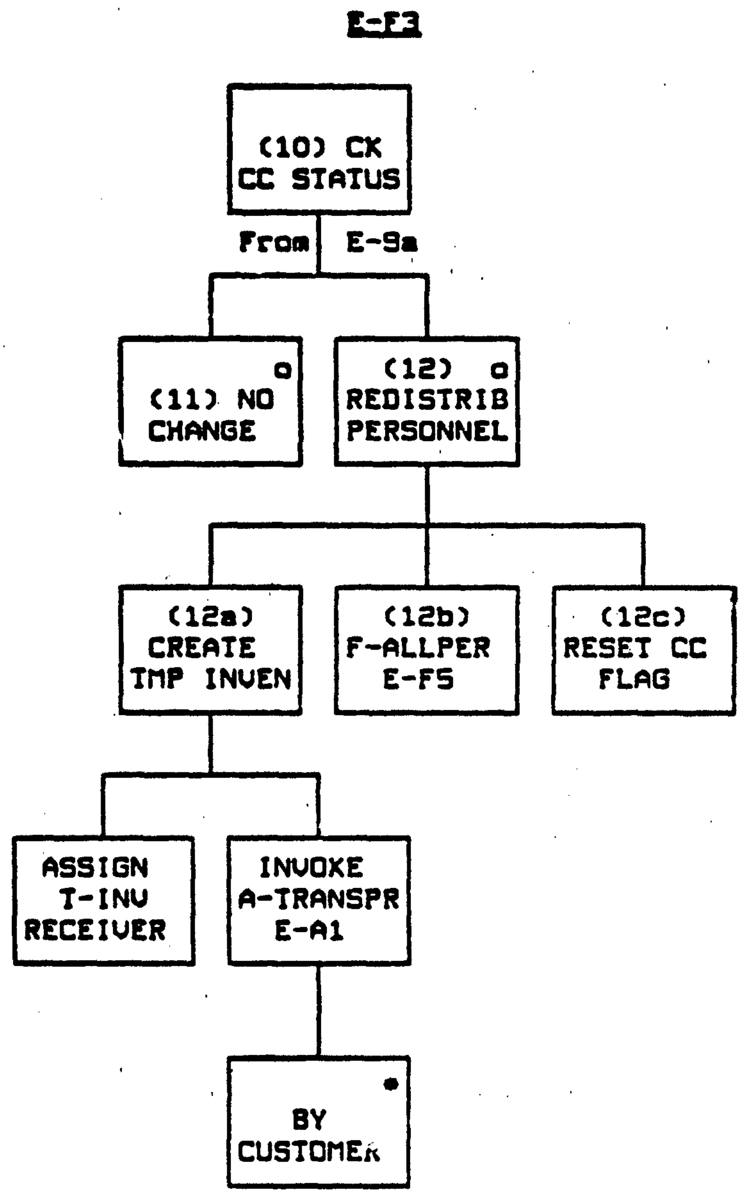

Figure E-9c. F-DISPER generator (continued)

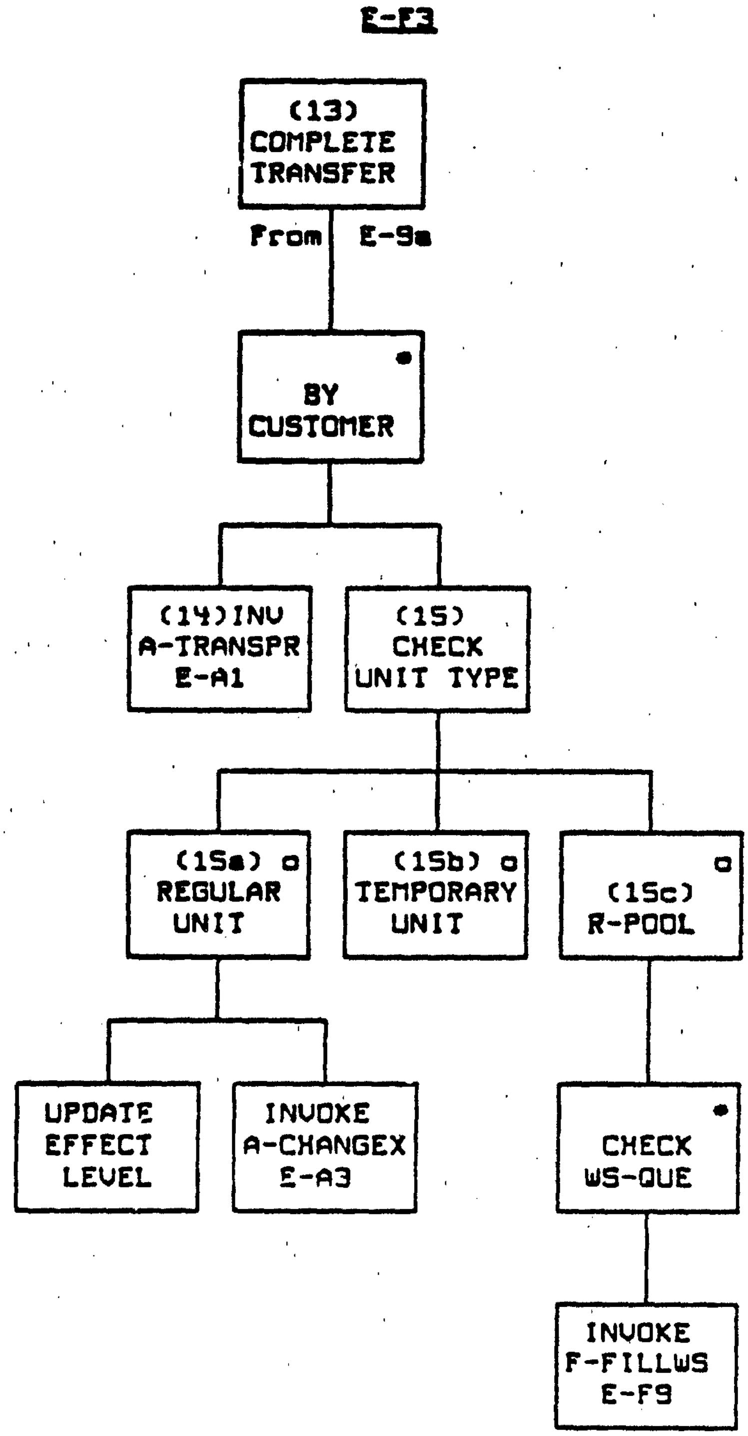

Figure E-9d. F-DISPER generator (continued)

E-F3

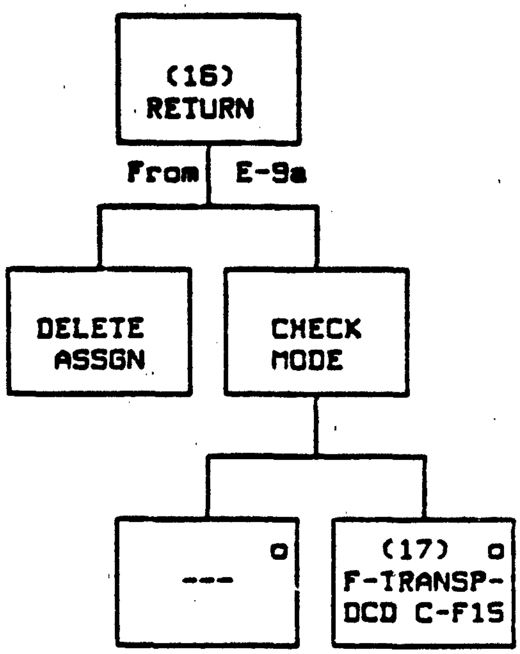

Figure E-9e. F-DISPER generator (continued)

E-F3

GENERATOR DESCRIPTION: F-DISPER

1. RECEIVE INFORMATION. The calling routine provides the holding unit ID, the ASSGN ID, the distribution point ID, the assigned personnel, and the transportation mode (D1).

2. CHECK TRANSPORTATION MODE. The transportation mode (D1) indicates whether the transfer is implicit or explicit. If explicit, the R-POOL ID is obtained from the distribution point state vector (D4).

3. TRANSFER ASSGN. A temporary ASSGN location (T-ASSGN) is initialized and the ASSGN is transferred to it (D2) from the R-POOL's W-Queue.

4. CHECK SITUATION. The status of the P-CUSTOMERs and the personnel are checked before distribution.

5. CHECK FOR ATTRITION. For each category of personnel, the number which has arrived is compared with the number which should have arrived using the assigned personnel (D1) and the ASSGN's total count.

6. CHECK P-CUSTOMER STATUS. Each P-CUSTOMER's unit status (S3) must be checked to make sure the unit is able to receive personnel (i.e., is alive and active).

7. DETERMINE DESTINATION. If a P-CUSTOMER can no longer receive personnel, the original holding unit ID (D1) is checked to determine where the personnel should go.

a. W-QUEUE. If the personnel were still in the waiting queue (W-Queue), they are reassigned to the R-POOL inventory by substituting the R-POOL ID (S3) for the P-CUSTOMER ID in the T-ASSGN.

b. OTHER. If the personnel are held elsewhere, the temporary inventory ID (D2) is substituted for the P-CUSTOMER ID and a command and control flag is set (D5).

8. NO CHANGE. When the P-CUSTOMER's status is unchanged, no redistribution is necessary.

9. CHECK FOR TOTAL CANCEL. If all P-CUSTOMERs have been cancelled, the T-ASSGN ID (D2) is replaced with the R-POOL ID (S3) so that personnel will be returned to the R-POOL.

10. CHECK COMMAND AND CONTROL STATUS. If any personnel are to be redistributed, the CC flag (D5) will have been set.

F-DISPER (cont.)

11. NO CHANGE. If the CC flag is not set, redistribution is not necessary.

12. REDISTRIBUTE PERSONNEL.

a. CREATE TEMPORARY INVENTORY. The personnel are removed from the inactive (i.e., nonreceiving) P-CUSTOMER allocations and added to the temporary inventory (S2).

b. INVOKE F-ALLPER. Personnel are reassigned to the active (i.e., receiving) P-CUSTOMERs by the allocate personnel function (F-ALLPER). The parameters required include the T-ASSGN, holding unit ID, and distribution point ID.

c. RESET FLAG. The CC flag is reset (D6).

13. COMPLETE TRANSFER. The allocated personnel are transferred to each P-CUSTOMER unit.

14. INVOKE A-TRANSPER. Personnel are transferred to the P-CUSTOMER category by category (S3) using the T-ASSGN ID, the ASSGN ID, and the P-CUSTOMER ID (D2).

15. CHECK UNIT TYPE. The P-CUSTOMER type (S3) is checked for further action.

a. REGULAR UNIT. When the P-CUSTOMER is a combat unit, its effectiveness levels are updated and the due-in (S3) associated with the specified RQST/ASSGN is removed by invoking A-CHANGEX.

b. TEMPORARY UNITS. No change occurs for temporary units.

c. R-POOL. When the P-CUSTOMER is an R-POOL inventory, F-FILLWS is invoked using the P-CUSTOMER ID (R-POOL ID) to process any unfilled WS-RQSTs.

16. RETURN.

a. REMOVE ASSGN. The now-empty ASSGN records, held in the R-POOL's W-QUEUE, are removed.

b. CHECK TRANSPORTATION MODE. If the personnel allotment was delivered by convoy, control is returned to the transportation module and F-TRANSP-DECIDE is triggered so that the transporter's next move can be determined. Otherwise, control returns to the dispatcher.

E-F4 **F-CHINV** TYPE: Interactive Function

SUMMARY: The check inventory (F-CHINV) function determines the number of manned systems/tasks available and the size of personnel imbalances (excesses and deficiencies) at a P-CUSTOMER unit. The total number of each specified systems/task available at the P-CUSTOMER is counted and the number and type of personnel required for each are determined. The personnel (available and due-in) of each required category are counted and the total number of manned systems are calculated. The personnel imbalances are determined by comparing the available totals to the required totals in each category.

TRIGGERED BY:

Any module	
F-PEREP	(E-F1)
F-CHKCUS	(E-F11)

RESULTING IN:

F-CALPER	(E-F6)
Unit shortfall and excess data	
Weapon effectiveness data	

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-10.

E-F4

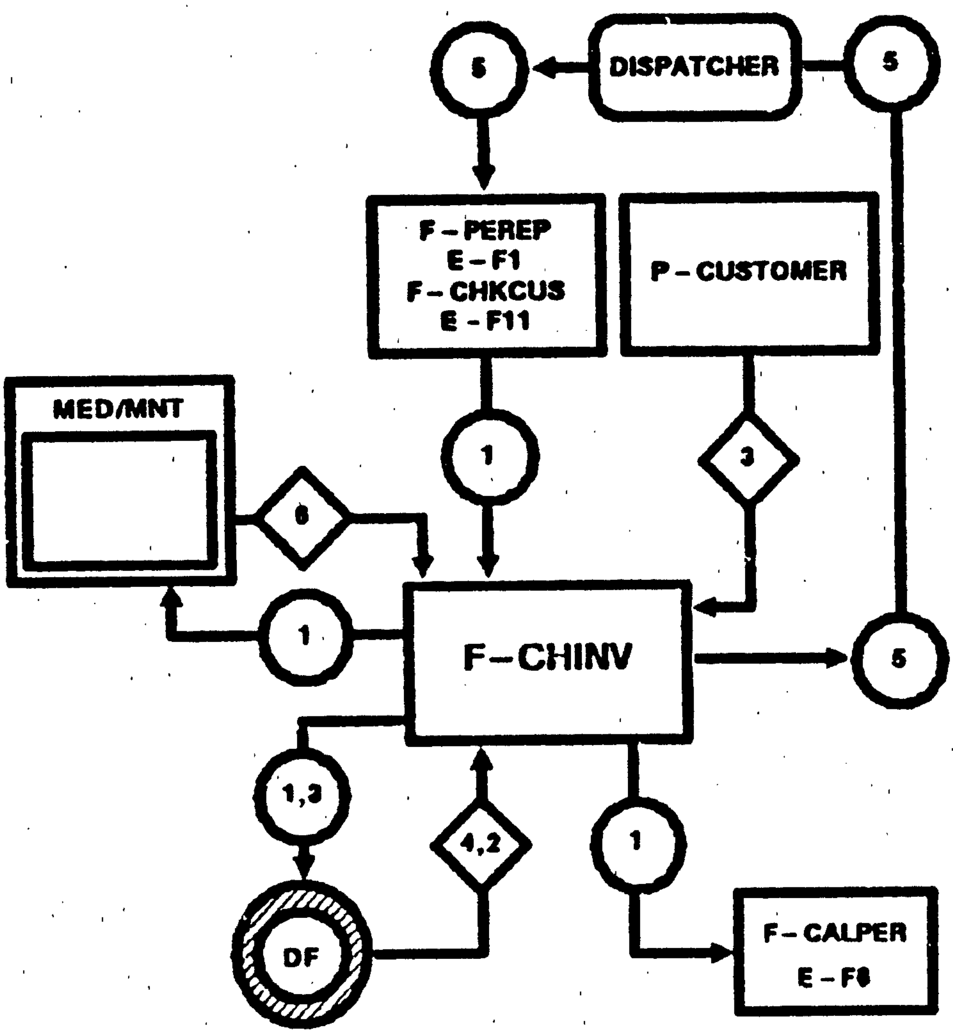

Figure E - 10. F-CHINV SSD

DATA DEFINITION: F-CHINV

Connection Number	Data Transferred	Comments
D1	o RQMT/Queue ID	The location to store returning information.
	o P-CUSTOMER ID	The unit to be evaluated.
	o Required systems	The type of systems to be evaluated.
	o Required response	The type of information required (e.g., number of manned systems; number of excess personnel; shortfall.
D2	o Weapon system-crew table	A table showing the number and type of personnel needed for each weapon/task (E-DF1).
S3	o P-CUSTOMER state vector	
	o P-CUSTOMER inventory available systems	The number of the specified weapon systems assigned to the customer.
	o P-CUSTOMER inventory personnel	The number of each type of personnel available to the unit.
	o P-CUSTOMER due-in	The number and type of personnel assigned to the customer but not yet available.
D4	o Evaluation rqmt	A temporary location holding the evaluation data containing the following elements (see E-DF10):

E-F4

DATA DEFINITION: F-CHINV (cont.)

Connection Number	Data Transferred	Comments
D4 cont.	o Required systems	The number and type of weapon systems involved.
	o Required personnel	The number of each type of personnel required to man the systems available.
	o Total personnel	The P-CUSTOMER's available personnel plus the expected personnel (due-in).
D5	o Crewed systems count	The number of the specified systems/tasks having full crews available.
	o Personnel imbalances	The number of personnel in each category either needed or in excess at the customer.
D6	o RTD personnel count	The number of injured/sick to be returned-to-duty (RTD). (The count will be supplied by the medical/maintenance module if it is not inherent in the unit state vector (S2).

E-F4

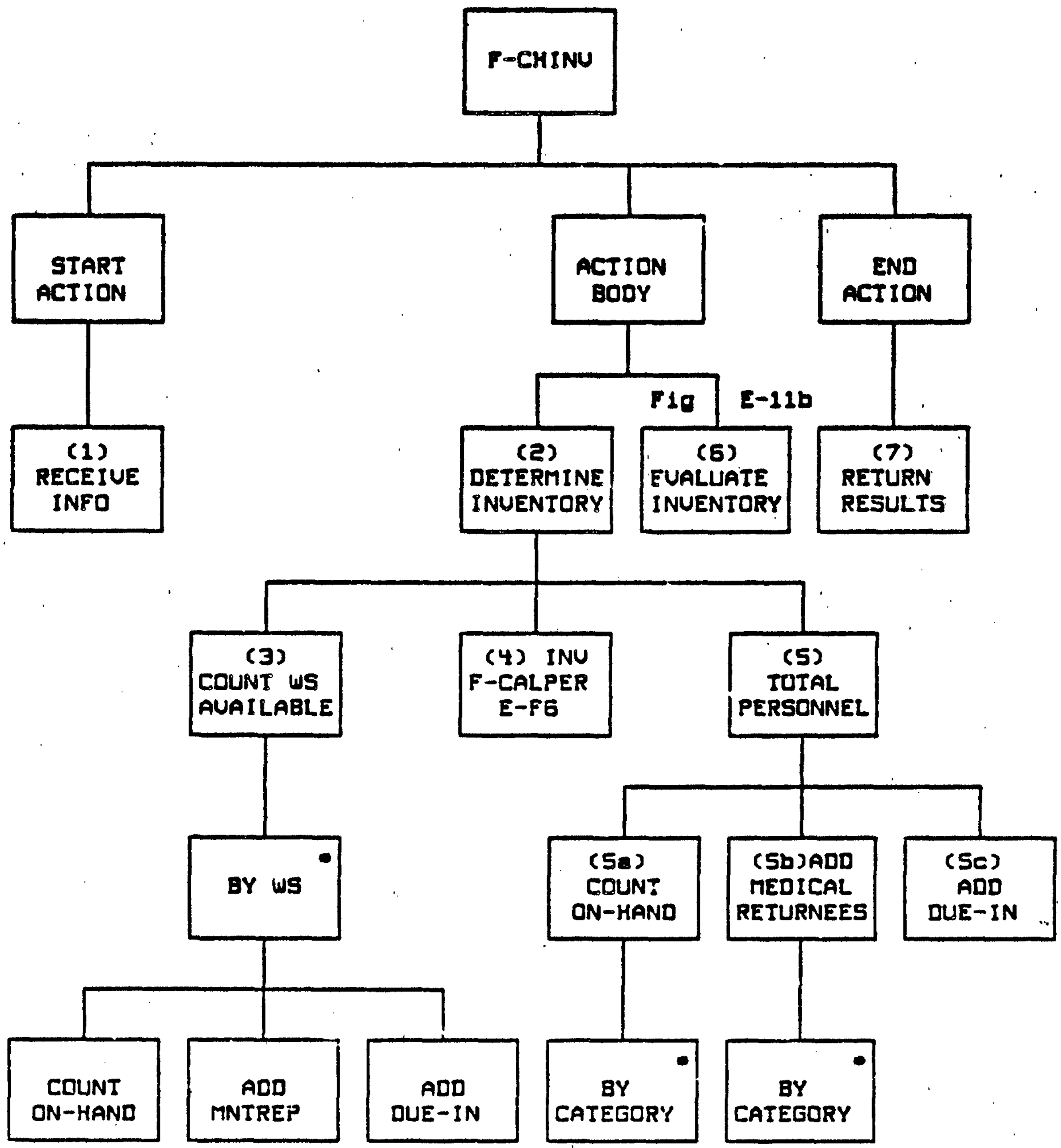

Figure E-11a. F-CHINV generator

E-F4

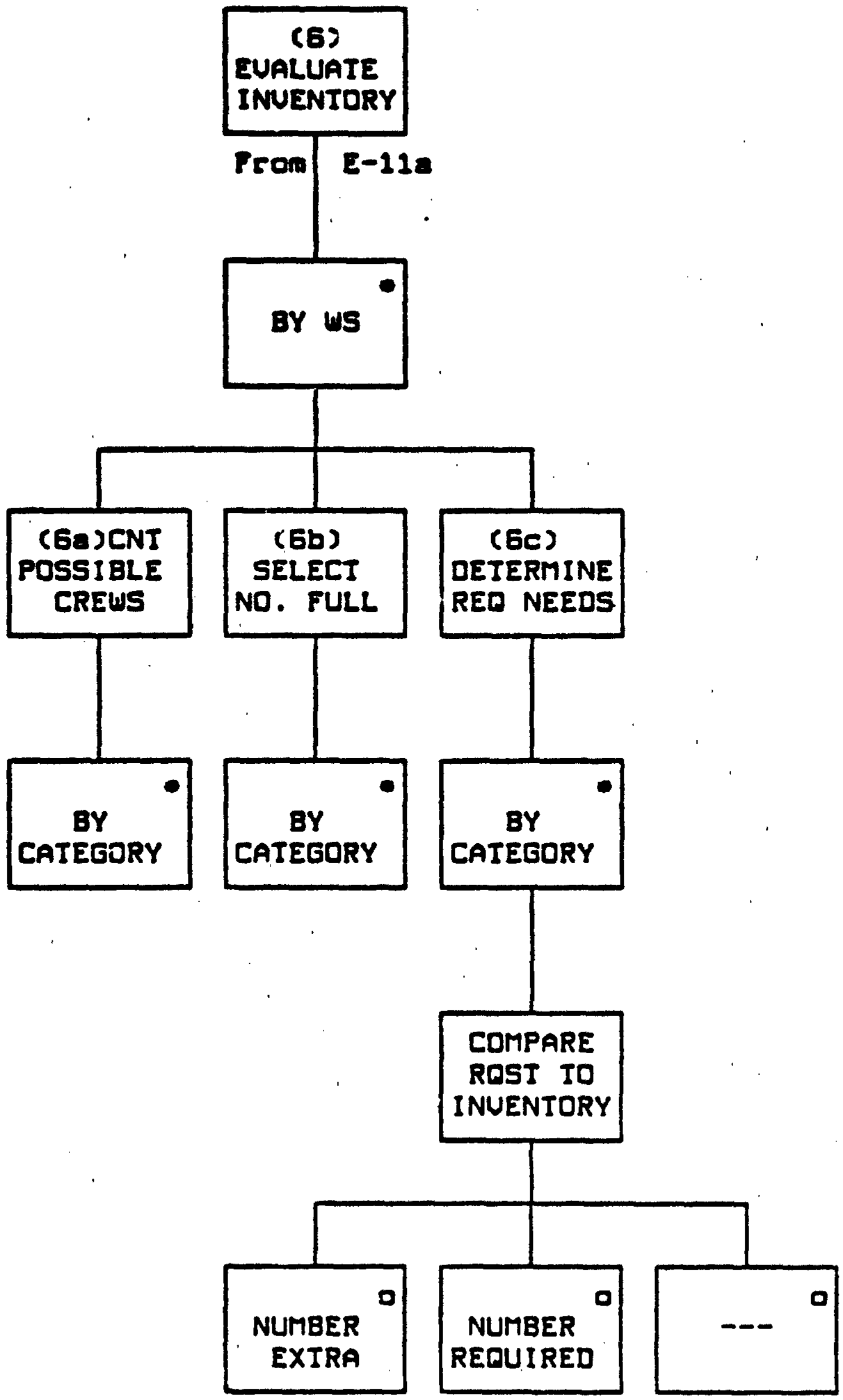

Figure E-11b. F-CHINV generator (continued)

E-F4

GENERATOR DESCRIPTION: F-CHINV

1. RECEIVE INFORMATION. The calling routine provides the P-CUSTOMER ID, the type of weapon systems/tasks concerned, the type of information required (i.e., the type of response desired, such as total inventory, excess, shortfall, etc.), and the location to which to transfer the information (D1).

2. DETERMINE INVENTORY. The P-CUSTOMER's weapon system inventory is checked; each required system is counted; the personnel types required are determined; and the required number of each type is calculated and stored in D4.

3. COUNT WEAPON SYSTEMS ON HAND. The number available of each specified system is counted (S3).

4. INVOKE F-CALPER. The number of each personnel type required to man the systems (D4) is calculated by F-CALPER (D1).

5. TOTAL PERSONNEL. The total number of each required personnel type (D4) is calculated by adding the total available to the total due-in (S3). (NOTE: If the total available in S2 does not include both the total on-hand and the total RTD (i.e., the assigned injured and sick who have not been evacuated), then the RTD count must be obtained from the medical-maintenance module (D6).)

6. EVALUATE INVENTORY.

a. COUNT CREWS. The number of manned systems, the number of excess personnel, or the number of personnel required is calculated by grouping the available personnel in each category into crews using the weapon system/crew table (D2).

b. SELECT FULL CREWS. The number of full crews (D5) possible is determined by the minimum number of crews obtainable from a required personnel type (e.g., if a system requires one type A and four type B and four type As and twelve type Bs are available, then three full crews can be created (limited by type B) and one type A will remain)..

c. DETERMINE REQUIREMENTS. The excess or insufficiency of the required personnel types (D5) is determined by the difference between the total available personnel and the number required (D4) to man the available systems (e.g., using the previous example, if five full crews are required, three crews are available; one type A and no type B remain to fill the remaining two crews, so the shortfall is eight type Bs and one type A).

7. RETURN RESULTS. The information indicated by required response in D1 is entered into the RQMT/Queue (D1) and passed back to the caller.

E-F5 F-ALLPER TYPE: Interactive Function

SUMMARY: The allocate personnel function (F-ALLPER) separates groups of personnel into individual assignments based upon unit target effectiveness levels listed in the allocation table. F-ALLPER is invoked when it is necessary to distribute the available personnel among P-CUSTOMERs. The available personnel are distributed by category. If the total available in a category equals the total required by the P-CUSTOMERs, each receives its full share. If the total available is less, the allocation table is used to determine what amount each P-CUSTOMER should receive.

TRIGGERED BY:	F-PEREP	(E-F1)
	F-DISPER	(E-F3)
RESULTING IN:	R-POOL	
	A-ASSPER	(E-A2)
	P-CUSTOMER	
	A-CHANGEX	(E-A3)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-12.

E-F6

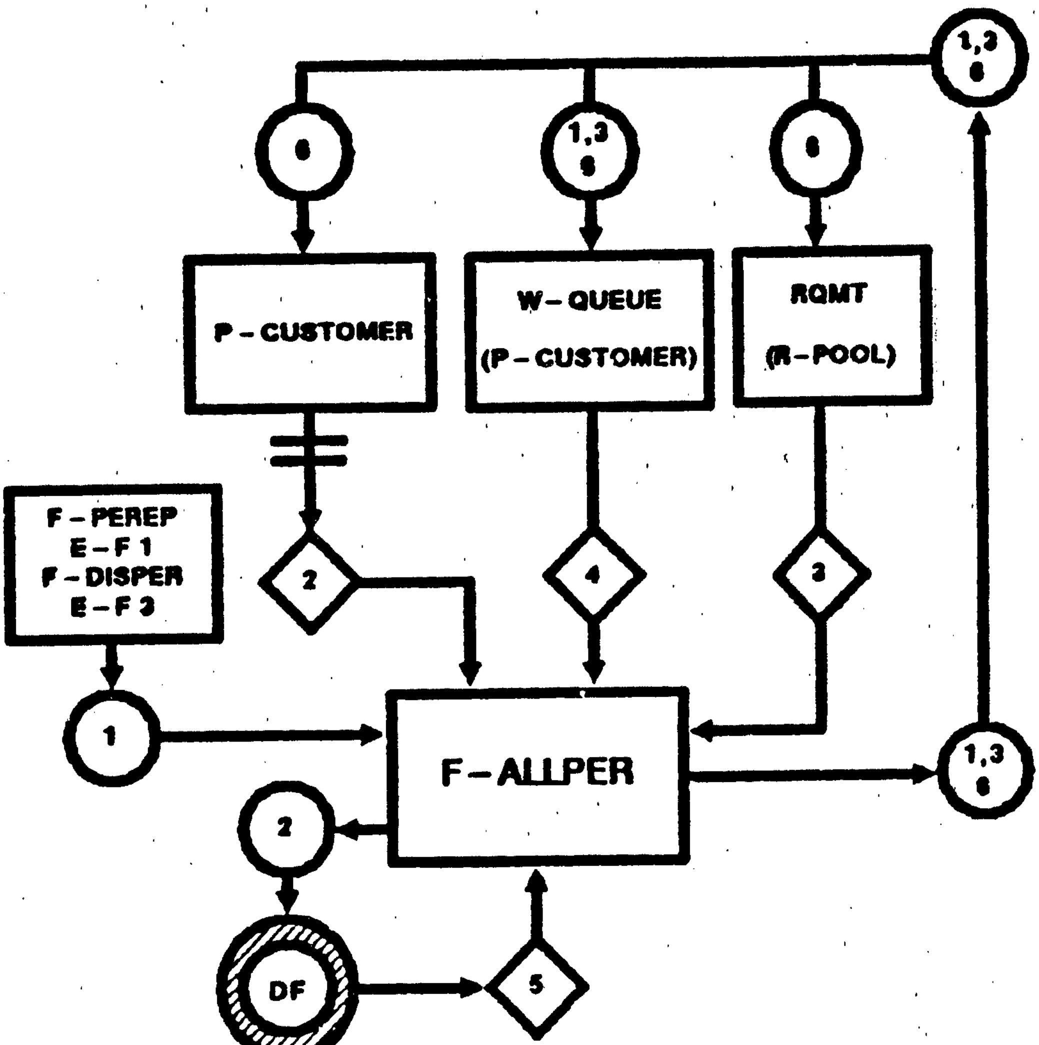

Figure E - 12. F - ALLPER SSD ..

DATA DEFINITION: F-ALLPER

Connection Number	Data Transferred	Comments
D1	o RQMT/W-Queue ID	The location holding the assigned personnel, the P-CUSTOMER IDs, and the P-CUSTOMER shortfall involved.
	o R-POOL ID	The R-POOL ID is used to locate the W-Queue in which the allocation will be built and to obtain the shortfall to be satisfied by the allocation.
	o Distribution point	The location to which a customer's allocation will be delivered.
S2	o P-CUSTOMER state vector	
	o Due-in	The customer's record of the expected arrivals.
	o Unit opcode, unit function	Parameters for the allocation code table.
D3	o RQMT	A temporary structure (E-DF10) initialized at the beginning of each R-POOL evaluation to house the following elements:
	o Customer IDs	Unit IDs of those R-POOL customers requiring personnel.
	o Customer shortfall	The corresponding personnel requirements, by category (9a).

DATA DEFINITION: F-ALLPER (cont.)

Connection Number	Data Transferred	Comments
D3 cont.	o Total shortfall	The R-POOL's current personnel requirement (9a).
	o Assigned personnel	The personnel, in each category, removed from the R-POOL inventory to meet the requirement (9c).
D4	o W-Queue	The location which holds the allocation while it is being built and until it can be delivered (E-DF8). Its contains:
	o ASSGN ID	(D1)
	o Distribution point	(S2)
	o P-CUSTOMER IDs	(D3)
	o P-CUSTOMER shortfall	(D3)
	o P-CUSTOMER allocations	(D6)
	o Distribution pt total	(D6)
	o Mode of transportation	(--)
D5	o Allocation table	A table (E-DF5) showing the target levels of effectiveness for units by opcode and function.
D6	o Allocated personnel	The number of each category assigned to each P-CUSTOMER.
	o Leftovers	The personnel remaining after redistribution.

E-FS

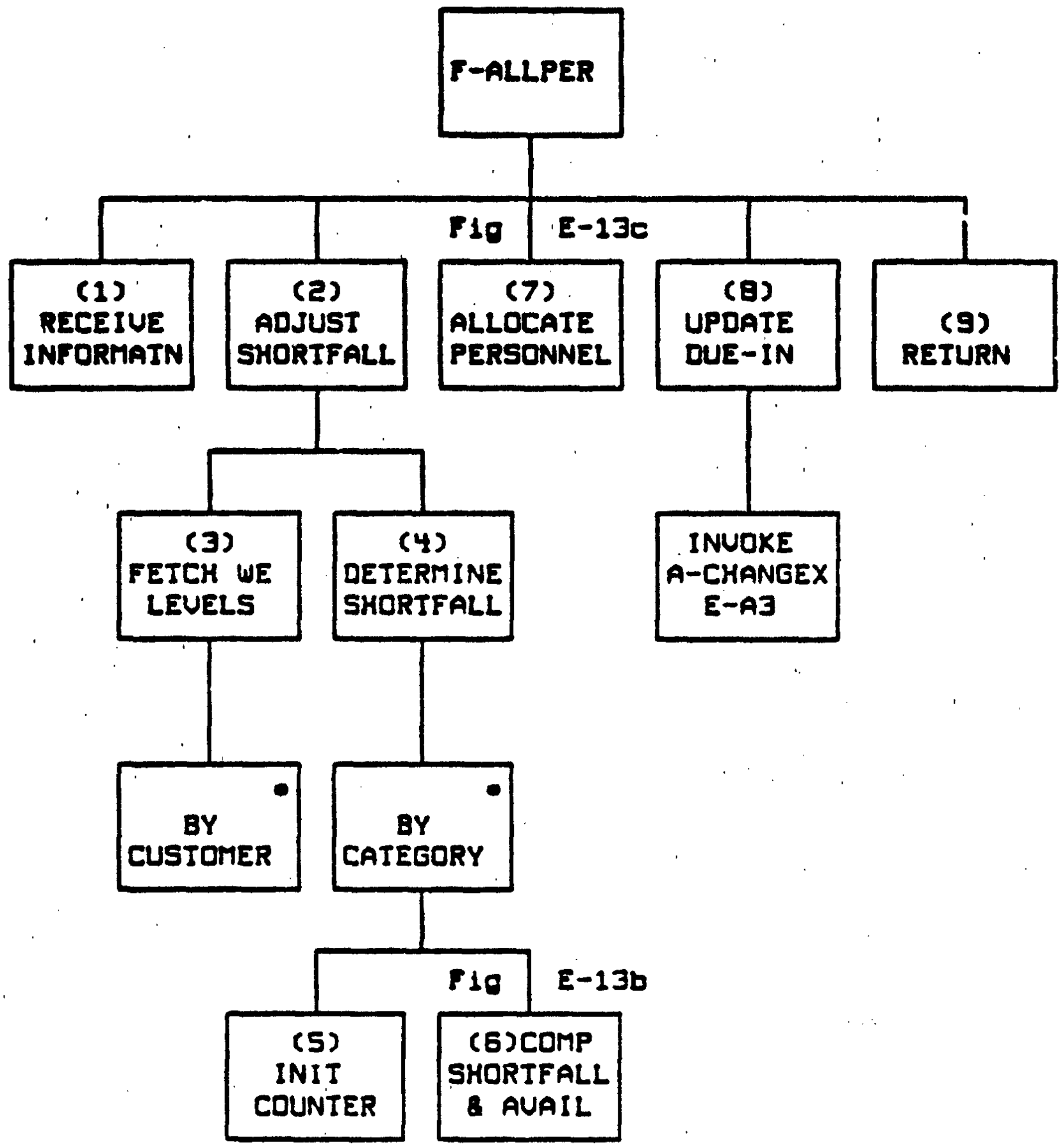

Figure E-13a. F-ALLPER generator

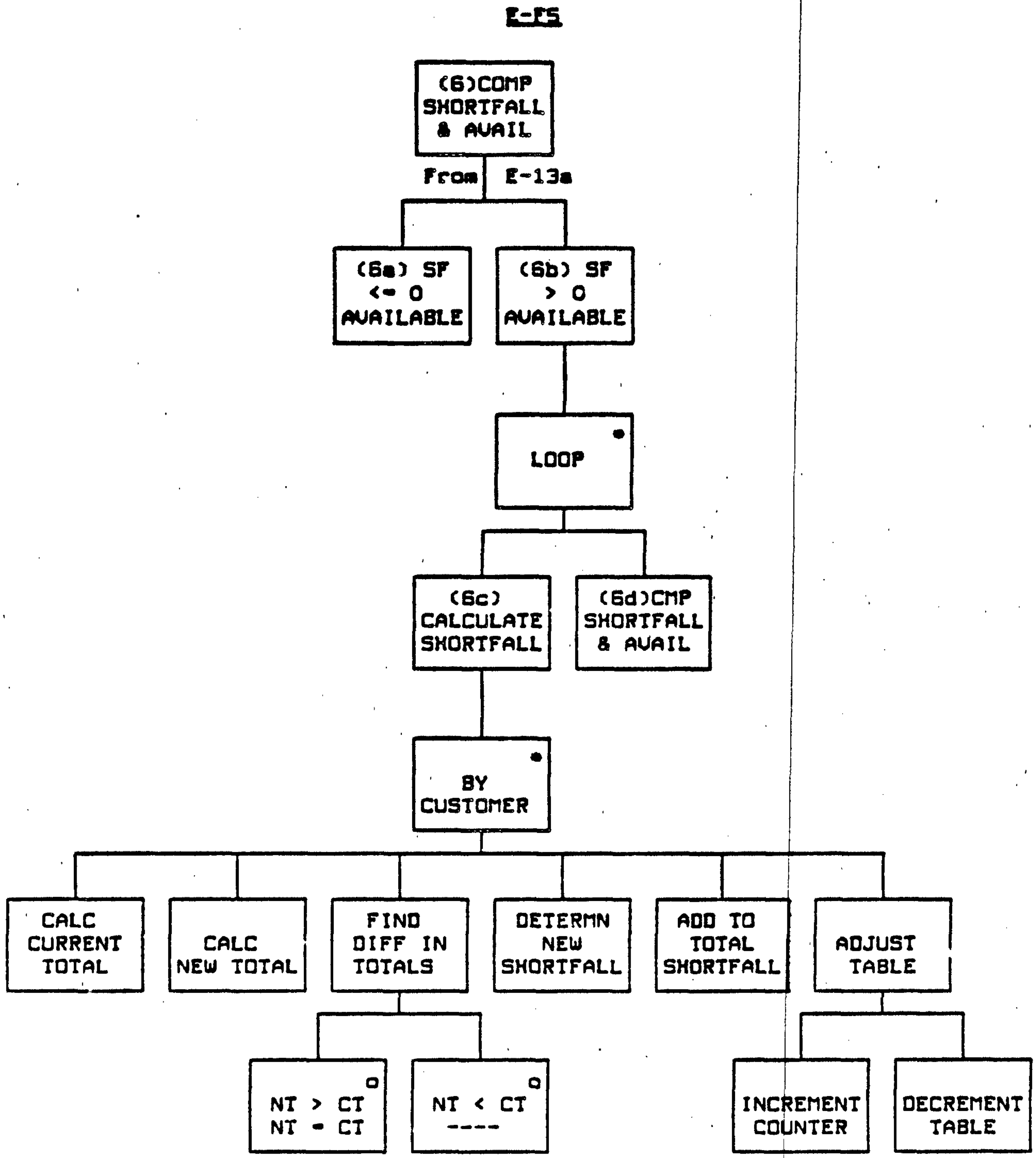

Figure E-13b. F-ALLPER generator (continued)

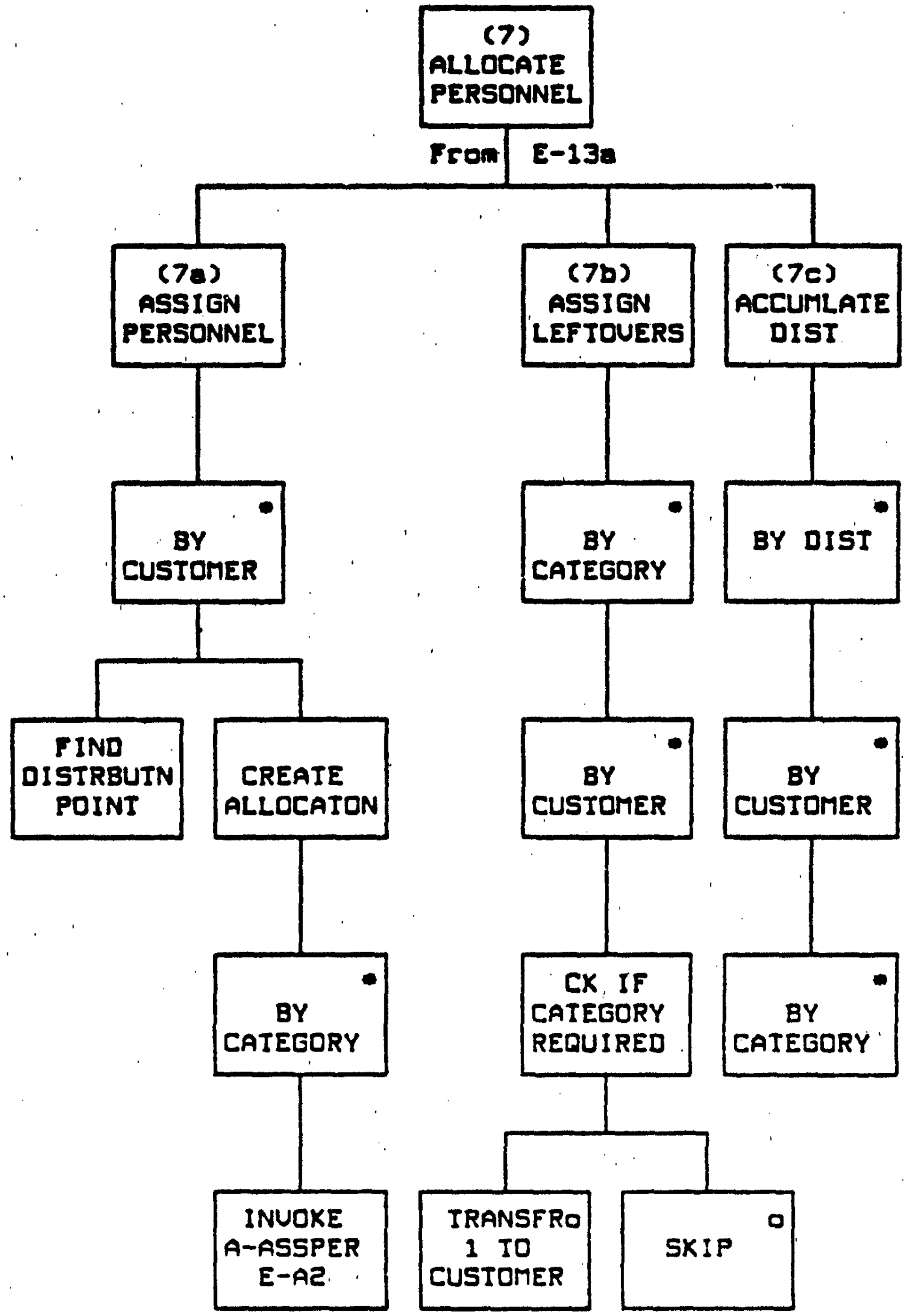

Figure E-13c. F-ALLPER generator (continued)

GENERATOR DESCRIPTION: F-ALLPER

1. RECEIVE INFORMATION. The RQMT and R-POOL and distribution point IDs are passed from the calling routine (D1). The contents of the RQMT are shown in D3. The R-POOL ID will be used to obtain the W-Queue (D4) which will house the assignment until it can be transported.

2. ADJUST SHORTFALL. Each category of assigned personnel will be compared with the corresponding category in the total shortfall (D3). The individual P-CUSTOMER shortfalls will be adjusted by the algorithm if not enough personnel are available for all.

3. FETCH TARGET LEVELS. The P-CUSTOMER ID (D3) is used to obtain the opcode and function code needed to access the allocation table (D4) and obtain the target level of effectiveness for each P-CUSTOMER unit.

4. DETERMINE SHORTFALL. Each category of personnel is checked separately.

5. INITIALIZE COUNTER. A counter is used to keep track of the number of iterations taken. The count is used in the distribution algorithm.

6. COMPARE SHORTFALL AND AVAILABLE. The total shortfall in a category is compared to the total available for assignment (D3).

a. SHORTFALL <= AVAILABLE. If the shortfall is less than or equal to the number available, the total will be assigned.

b. SHORTFALL > AVAILABLE. If the number required is greater than the number available, the available personnel must be distributed.

c. CALCULATE NEW SHORTFALL. A new P-CUSTOMER shortfall is calculated based upon the values from the allocation table (D5):

- CALCULATE CURRENT TOTAL. The current total is calculated using the current effectiveness level and the current shortfall:

  SHORTFALL/(1 - CURRENT EFFECTIVENESS LEVEL) = TOTAL

- CALCULATE NEW TOTAL. The new total is determined by multiplying the total by the table value:

  TOTAL * ALLOCATION TABLE VALUE = NEW TOTAL

- FIND DIFFERENCE. The new total is subtracted from the old total. If the result is negative, it is set equal to 0:

  OLD TOTAL - NEW TOTAL = DIFFERENCE, where DIFFERENCE >= 0

F-ALLPER (cont.)

- DETERMINE NEW SHORTFALL. The new P-CUSTOMER shortfall is determined by subtracting the total difference from the old shortfall:

  CURRENT SHORTFALL - TOTAL DIFFERENCE = NEW SHORTFALL

- TOTAL SHORTFALL. The result is added to the new total shortfall. (D3)

- ADJUST ALLOCATION VALUE. The value obtained from the allocation table for each customer must be decremented for each iteration required by a personnel category:

  ITERATION COUNT + 1 = NEW ITERATION COUNT
  VALUE - (ITERATION COUNT/100) = NEW VALUE

d. COMPARE SHORTFALL TO AVAILABLE. The new shortfall is compared with the available personnel. If it is still greater, the process is repeated; if not, the allocation value is reset to its original table value and a new personnel category is checked.

7. ALLOCATE PERSONNEL. The categories of personnel will be distributed according to the new shortfall levels to be achieved.

a. ASSIGN PERSONNEL. A P-CUSTOMER's distribution point (S2) is identified and the W-Queue (D4) is searched to see if it is already listed. If not, it is added. Personnel are allocated by category to each P-CUSTOMER by the assign personnel action (A-ASSPER). The P-CUSTOMER ID, personnel category, number required, number available (D3), and ASSGN ID (D4) are parameters.

b. ASSIGN LEFTOVERS. Any category with personnel still available (D5) is uniformly distributed to the appropriate P-CUSTOMERs.

c. ACCUMULATE FOR DISTRIBUTION. The total number of personnel traveling to each distribution point is determined.

8. UPDATE CUSTOMER DUE-IN. The change expectations action (A-CHANGEX) is invoked to record the allocation in each P-CUSTOMER's due-in (S2).

9. RETURN.

E-F6 F-CALPER TYPE: Interactive Function

SUMMARY: The calculate personnel function is called when it is necessary to determine the categories and number of personnel required to build crews for specified systems. F-CALPER determines the number of each type of personnel required for one crew and multiplies it by the number of crews needed.

TRIGGERED BY: F-NUSWR (E-F7)
F-CHINV (E-F4)

RESULTING IN: Personnel Requirements

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-14.

E-F8

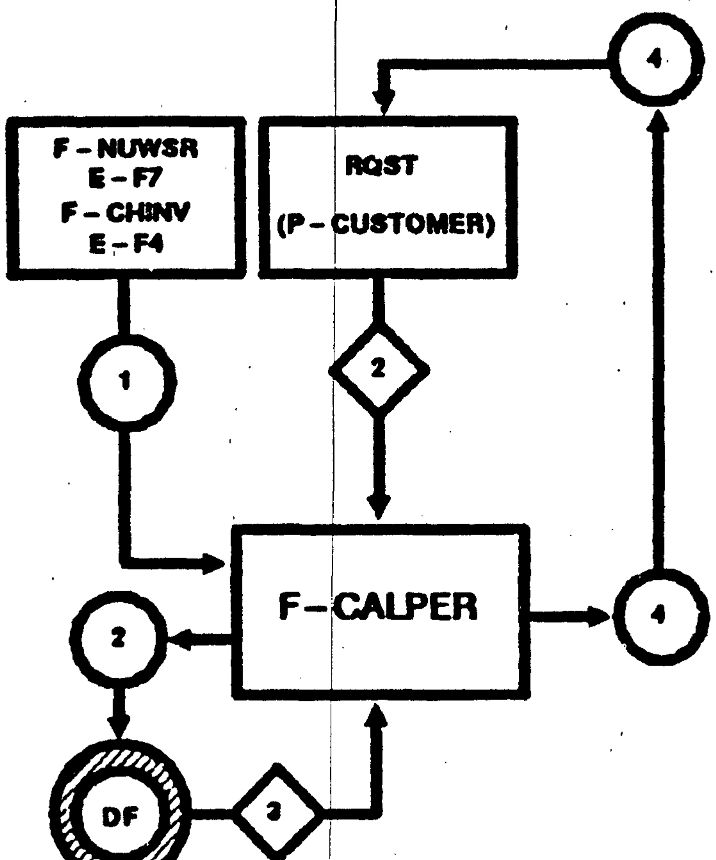

Figure E-14. F-CALPER SDD

DATA DEFINITION: F-CALPER

Connection Number	Data Transferred	Comments
D1	o Queue/Rqmt ID	The ID of the location (WSR-Queue, W-Queue or evaluation rqmt) where the RQST/RQMT resides. Note that the location is treated as a P-CUSTOMER entity in this function (see E-DFB-10).
	o RQST ID	The supply allocation ID or the PEREP ASSGN ID, if any.
S2	o Queue/Eval rqmt	The structure containing the following elements (E-DFB-10):
	o Required systems	The number of each type of weapon system specified.
	o Required personnel	The number of each category required to man all of the specified systems.
D3	o System/crew table	A table showing the crew breakdown (category and number) for each system/task (E-DF1).
D4	o Personnel required	The number of each category of personnel needed for each required system, (accumulated by personnel category in S2).

E-F6

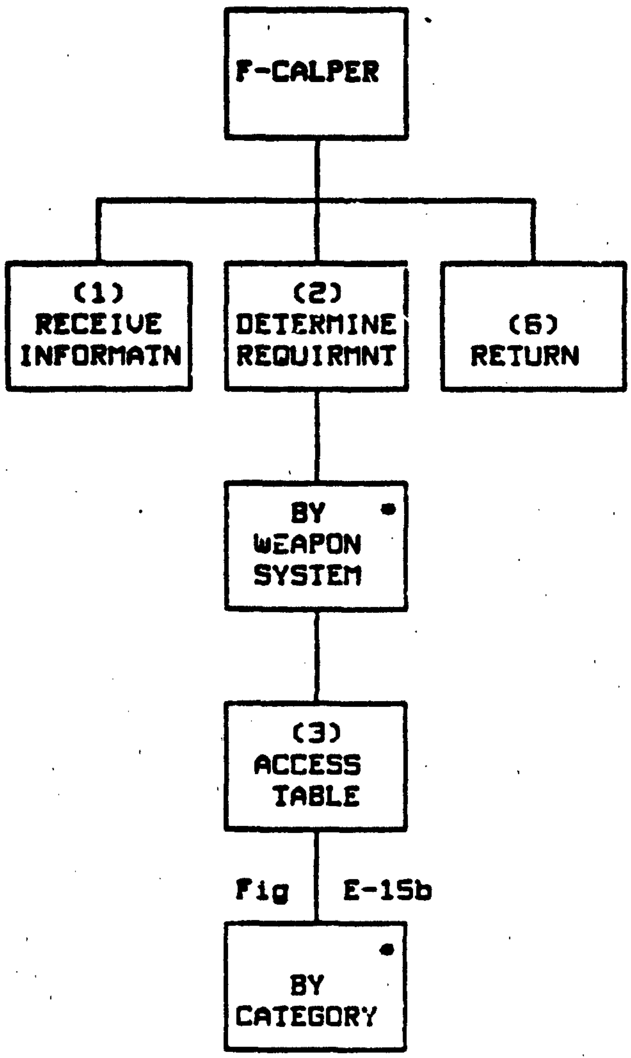

Figure E-15a. F-CALPER generator

E-F6

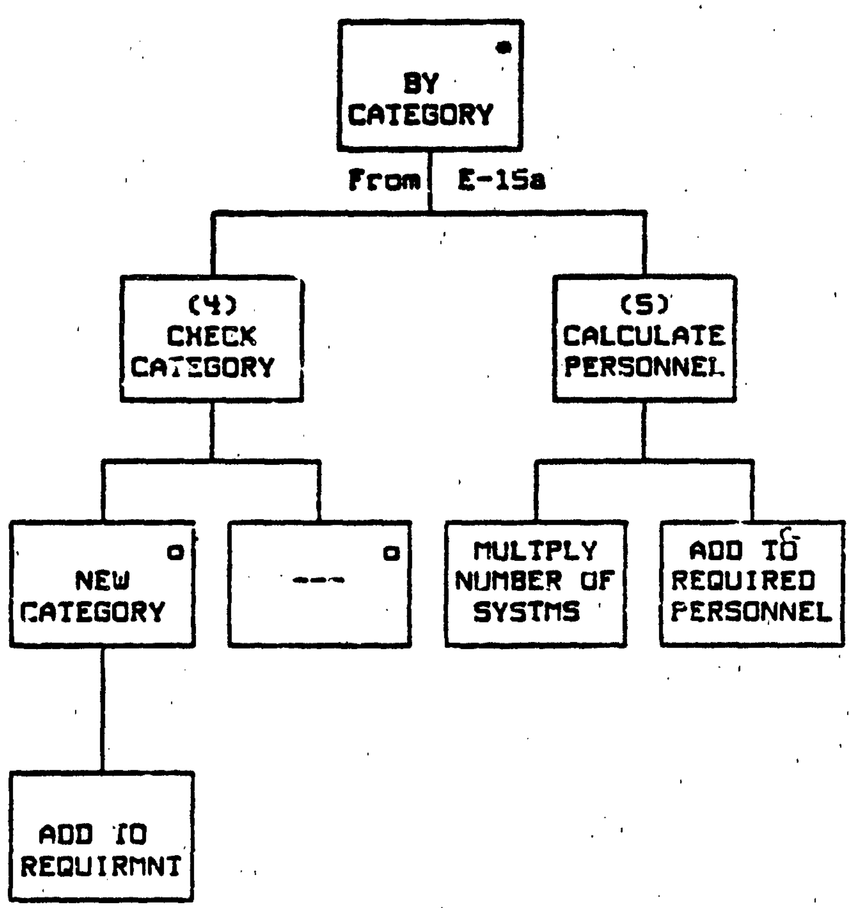

Figure E-15b. F-CALPER generator (continued)

E-F6

GENERATOR DESCRIPTION: F-CALPER

1. RECEIVE INFORMATION. The calling routine passes in the Queue ID and ROST ID (D1).

2. DETERMINE REQUIREMENT. The number of personnel in each category required to man the specified systems is calculated.

3. ACCESS TABLE. The crew table (D3) is accessed for each system (S2). The personnel categories required by the system are obtained.

4. CHECK CATEGORY. Each category is checked against the existing required personnel (S2) to see if the category is already listed. If not, it is added.

5. CALCULATE REQUIRED PERSONNEL. For each system, the number of each category required by one crew (D3) is multiplied by the number of systems required (S2). The result (D4) is added to the accumulated required personnel by category (S2).

6. RETURN.

E-F7

E-F7 **F-NUWSR** TYPE: Interactive Function

SUMMARY: When supply needs crews to man weapon systems, it invokes F-WSRO (E-F2) which checks to see if the supply request is new or old. For new requests, F-WSRO invokes the new WS request function (F-NUWSR) which creates a crew request (RQST) and attempts to fill it by checking the WS-Customer, the R-POOL, and the WS-Customer's sister units for excess personnel. From the personnel obtained, crews are built and counted. The number of full crews for each system specified is returned to F-WSRO.

TRIGGERED BY:	F-WSRO	(E-F2)
RESULTING IN:	F-CALPER	(E-F6)
	F-SUPPER	(E-F10)
	F-ARRCRU	(E-F12)
	R-POOL Demand updated	

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-16.

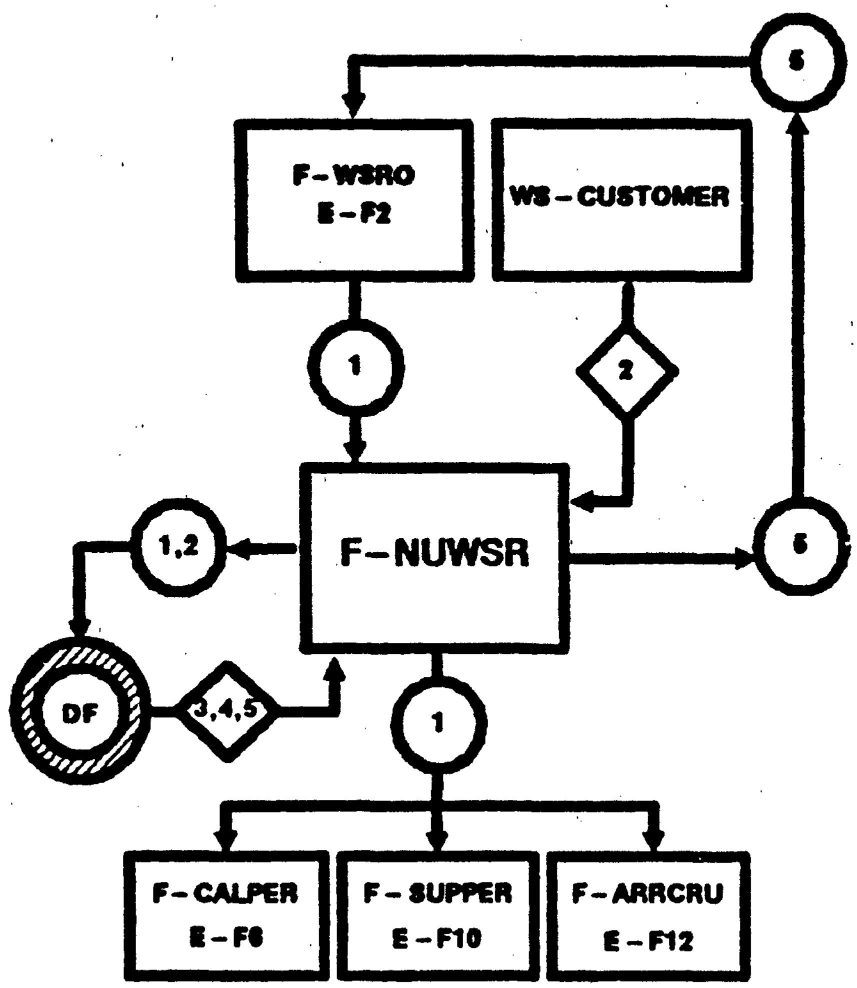

Figure E-16. F-NUWSR SSD

DATA DEFINITION: F-NUWSR

Connection Number	Data Transferred	Comments
D1	o ROST ID	The allocation ID from supply.
	o WS-Customer ID	The ID of the unit to receive the manned system.
	o Systems required	The type and number of systems needing crews.
	o WSR-Queue ID	The queue where the ROST will be built.
S2	o WS-Customer state vector	
	o R-POOL ID	The R-POOL assigned to the customer.
D3	o WSR-Queue	A ROST holder (E-DF9) containing:
	o ROST ID	Filled by D1.
	o WS-Customer ID	Filled by D1.
	o Systems required (number and type)	Filled by D1.
	o Personnel required	The number of each category required to fill the request.
	o Personnel available	The number of each category alreadv obtained.
	o Personnel allocated	The number of each category already assigned to crews.
	o Crews available (number and type)	Filled by D5 (F-ARRCRU).

DATA DEFINITION: F-NUWSR (cont.)

Connection Number	Data Transferred	Comments
D4	o R-POOL demand	The personnel requirement, by category, on the R-POOL during the current period. Accessed using R-POOL ID (S2)(E-DF7).
D5	o Crew count	The number of each type of crew already formed.

E-F7

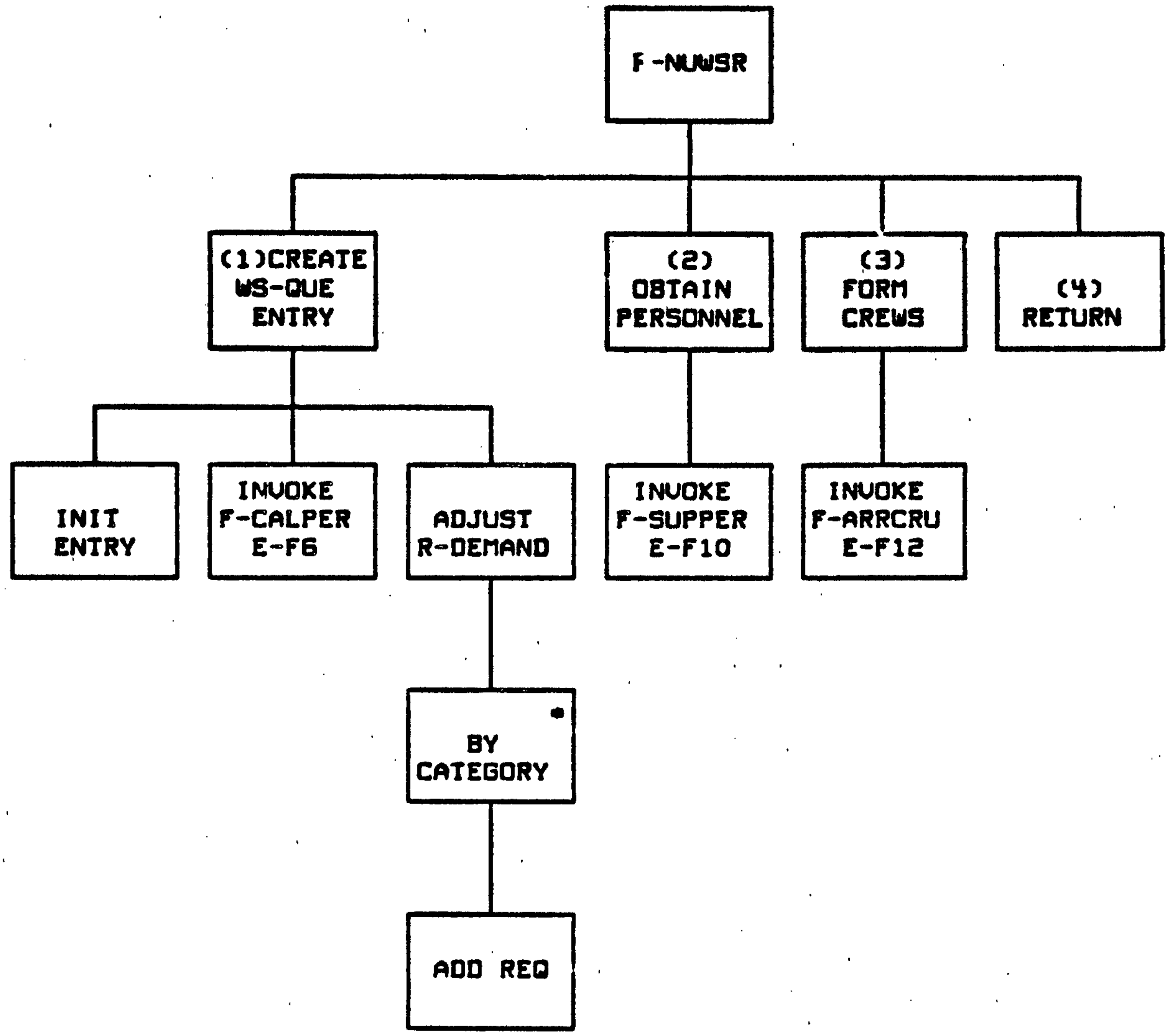

Figure E-17. F-NUWSR generator

GENERATOR DESCRIPTION: F-NUWSR

1. CREATE WS RQST. The RQST ID, WS-Customer ID, systems required, and WSR-Queue ID are passed from F-WSRO (D1).

a. ENTER RQST. The RQST is entered into the WSR-Queue by storing the RQST ID, the WS-customer ID, and the system requirements (D3).

b. INVOKE F-CALPER. The number of each type of personnel required for each specified weapon system is calculated by invoking the calculate personnel function (F-CALPER). The parameters required are the number and type of each weapon system (D1). F-CALPER creates a list of the required personnel types and calculates the humber required of each and returns the values to the RQST (D3).

c. ADJUST R-POOL DEMAND. The personnel requirements (D3) are added to the current R-POOL demand (D4) by category.

2. INVOKE F-SUPPER. The supply personnel function (F-SUPPER) is invoked using the RQST ID and the WSR-Queue ID (D1). It obtains personnel from the WS-Customer, the R-POOL, and the WS-Customer's sisters (units under the same brigade and/or sharing the same distribution point) and adds them to the available personnel in the RQST (D3).

3. INVOKE F-ARRCRU. The personnel available are allocated into crews (D3) by the arrange crews function (F-ARRCRU). The WSR-Queue ID and RQST ID are the calling parameters and the number of crews formed (D5) is added to the RQST (D3).

4. RETURN. The number of each type of crew (D5) is returned to F-WSRO, the calling routine.

E-F8 **F-OLWSR** TYPE: Interactive Function

SUMMARY: When F-WSRO (E-F2) is invoked by supply, it checks to see if the RQST ID passed by the caller is for a new RQST or an old one. If the RQST already exists, supply is asking that a portion of the original RQST be sent. F-OLWSR is called and checks to see if the number of crews to be delivered is currently available in the RQST. If not, the WS-Customer and its sister units are checked for excess personnel and crews are built. The crews and personnel to be supplied (either the number requested or the number available) are removed from the RQST and sent to join the weapon systems. The number of crews being transferred is returned to the caller.

TRIGGERED BY: F-WSRO (E-F2)

RESULTING IN:

RESULTING IN:	P-CUSTOMER	
	A-TRANSPER	(E-A1)
	F-ARRCRU	(E-F12)
	F-CHKCUS	(E-F11)
	R-POOL Demand updated	

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-18.

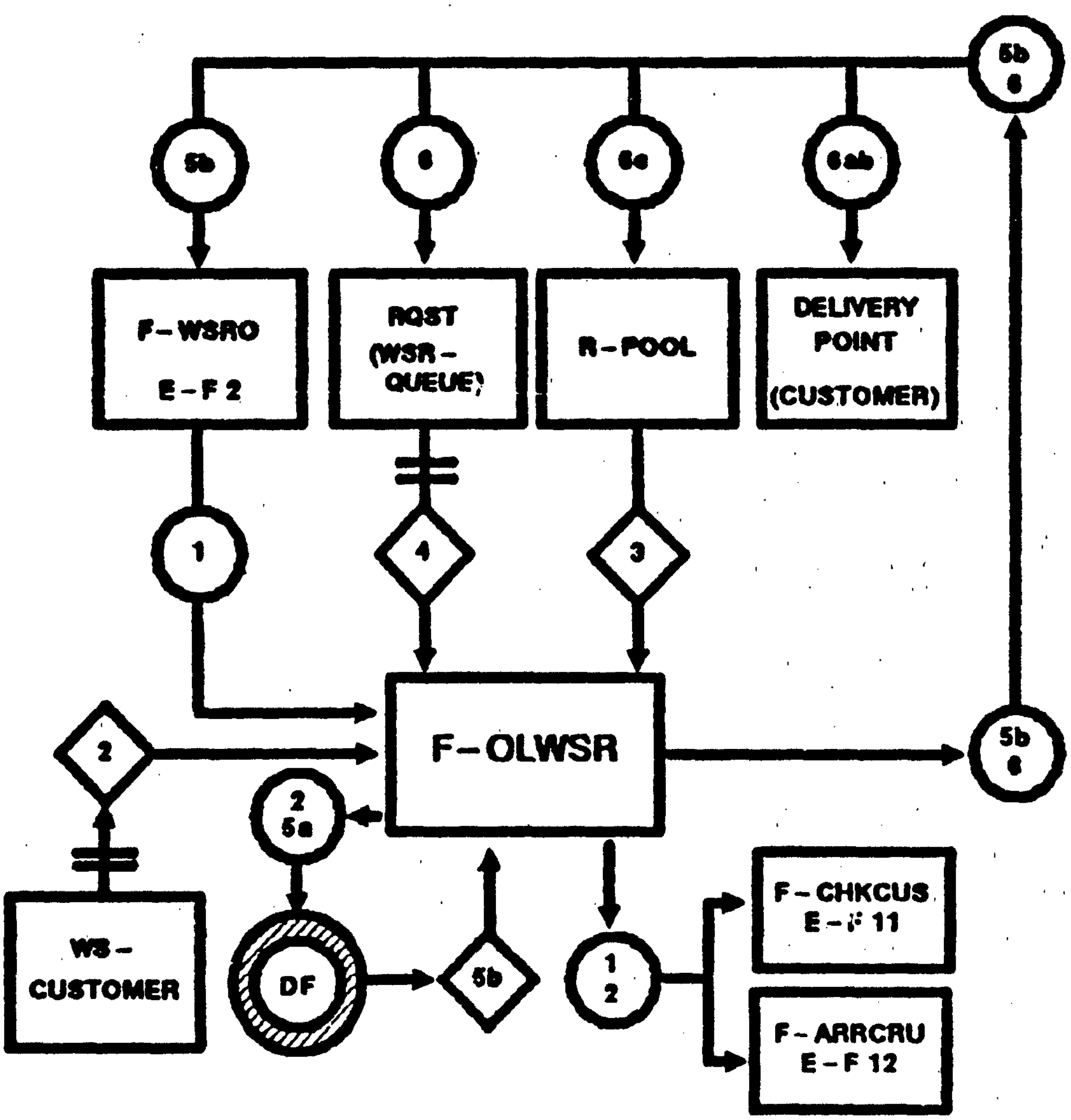

Figure E-18. F-OLWSR SSD

DATA DEFINITION: F-OLWSR

Connection Number	Data Transferred	Comments
D1	o RQST ID	Allocation ID from Supply.
	o Delivery point ID	The location that the crews are delivered to.
	o Systems requested	The number of each system to be manned immediately; it equals a portion of the original RQST.
	o WSR-Queue ID	ID of the temporary holding unit.
S2	o WS-Customer state vector	
	o Sibling IDs	IDs of the units that belong to the same brigade or share a distribution point with the WS-Customer.
	o R-POOL ID	The customer's R-POOL ID is used to locate the R-POOL demand and the R-POOL inventory.
S3	o The R-POOL state vector	
	o R-POOL inventory	The location that the extra personnel are returned to.
D4	o WSR-Queue	A temporary RQST holder containing the following elements (E-DF9):
	o RQST ID	The original allocation ID.
	o WS-Customer ID	The weapon system customer.

DATA DEFINITION: F-OLWSR (cont.)

Connection Number	Data Transferred	Comment
D4 cont.	o Systems required	The number of each type of system still required by the RQST.
	o Personnel required	The number of each type of personnel still required by the RQST.
	o Personnel available	The personnel available for allocation.
	o Personnel allocated	The personnel already assigned to crews.
	o Crews available	The number and type of crews composed of the allocated personnel.
D5a	o R-POOL demand	The personnel requested from the R-POOL during the current periodic cycle (E-DF7).
D5b	o Crew and personnel assignment	The information concerning the number of crew and personnel to be transferred (D4).
D6a	o Assigned personnel	The personnel to be transferred to the delivery location.
D6b	o Assigned crews	The crews assigned in response to the current request.
D6c	o Excess personnel	The personnel left over after all the crews have been formed. They are returned to the R-POOL inventory.

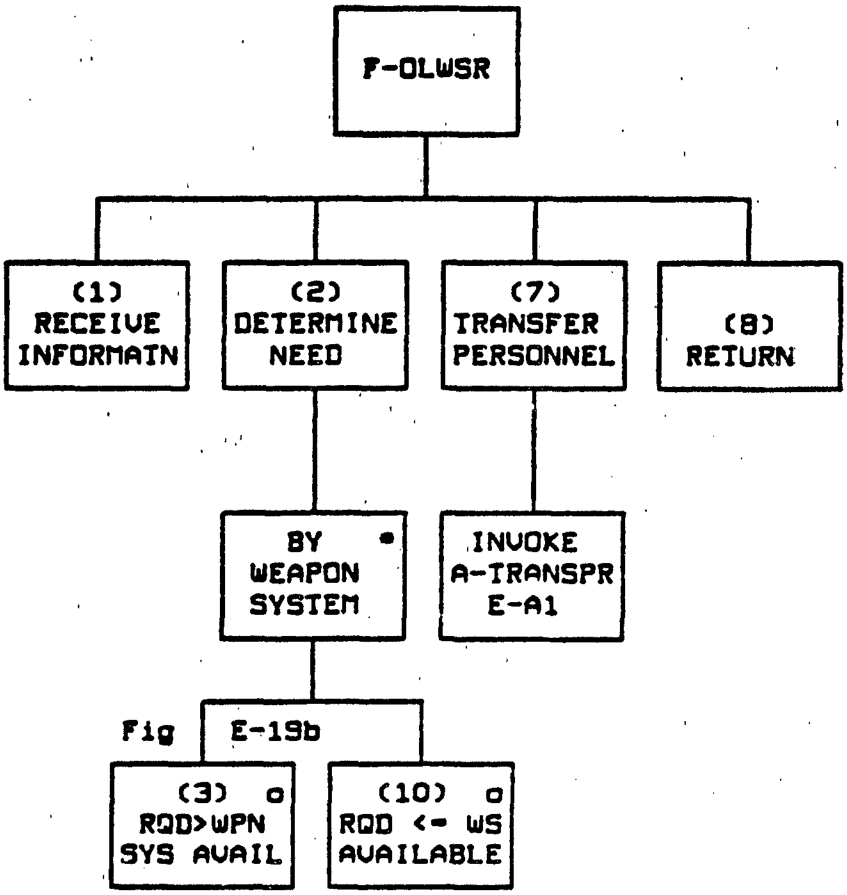

Figure E-19a. F-OLWSR generator

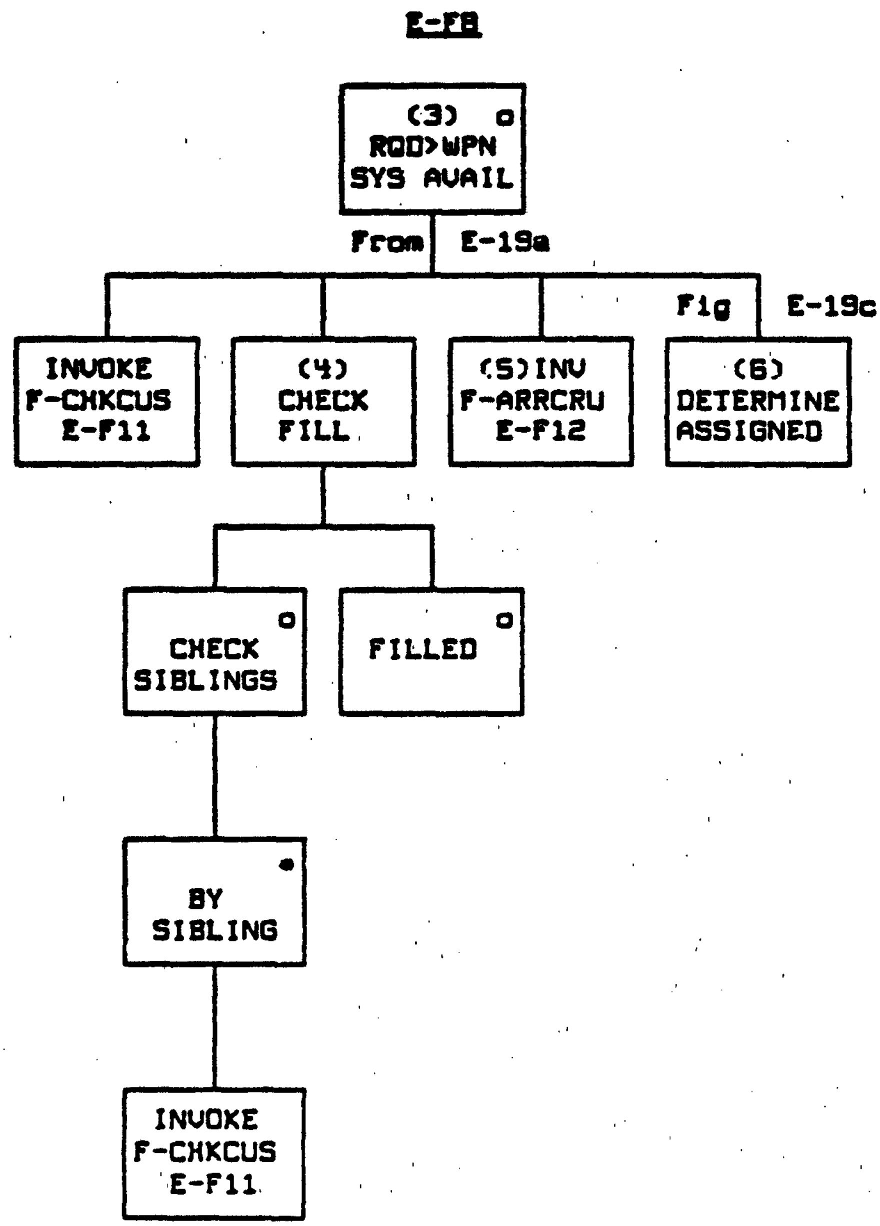

Figure E-19b. F-OLWSR generator (continued)

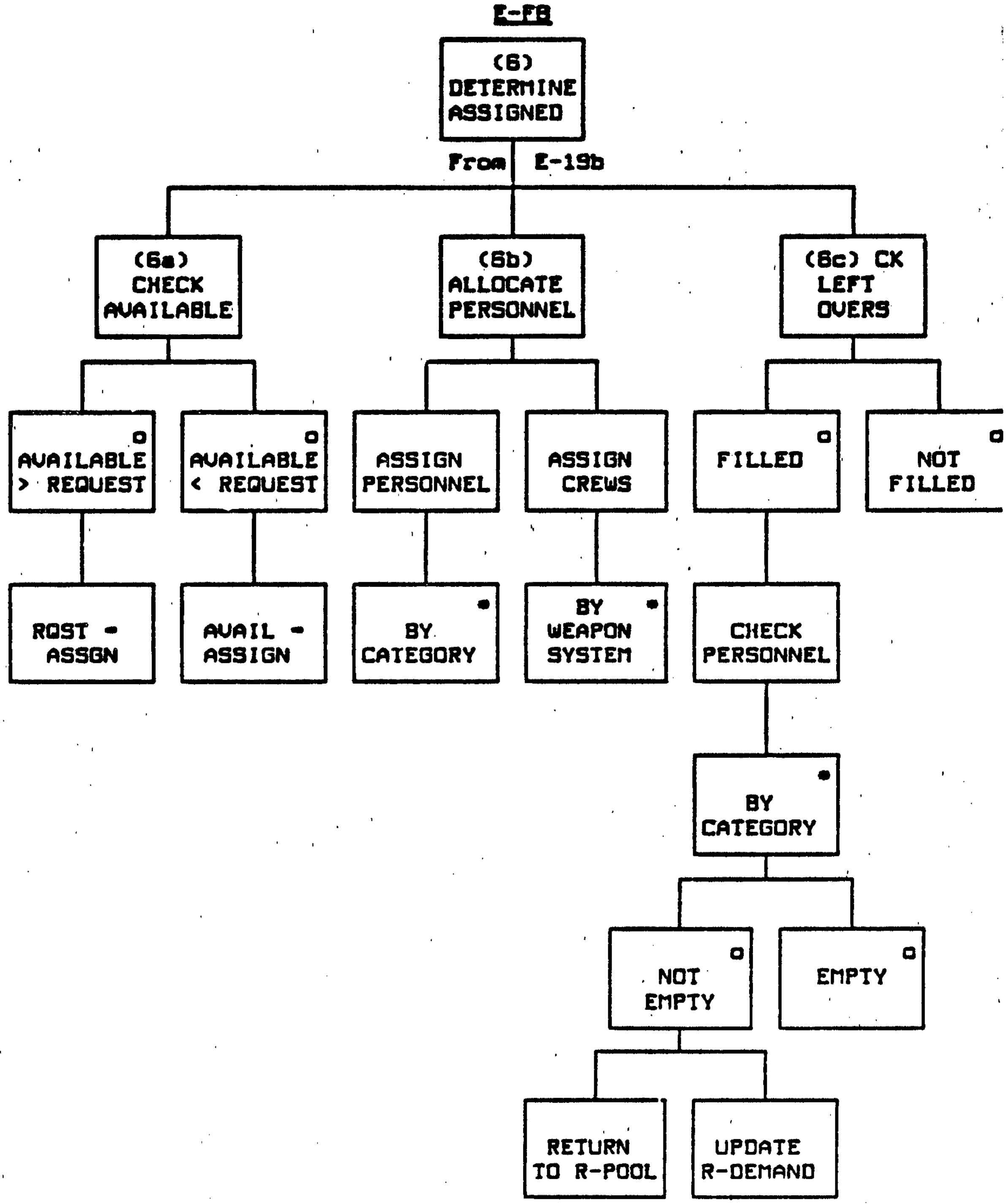

Figure E-19c. F-OLWSR generator (continued)

E-F8

GENERATOR DESCRIPTION: F-OLWSR

1. RECEIVE INFORMATION. F-WSRO passes the original RQST ID, the delivery point, systems required, and the WSR-Queue ID to F-OLWSR (D1).

2. DETERMINE NEED. The number of crews required by the current request (D1) is compared with the number of crews available (D4).

3. REQUIRED EXCEEDS AVAILABLE. If the required number exceeds the available number, the function attempts to provide additional personnel by using F-CHKCUS (E-F11) to extract the excess personnel from the WS-Customer. The WSR-Queue ID, RQST ID, and WS-Customer ID (D1, D4) are passed to the function and the R-POOL demand (D5a) and available personnel (D4) are updated.

4. CHECK FILL. The RQST is checked to see if it has been filled. If not, the F-CHKCUS is invoked passing a sister ID (S2) instead of the WS-Customer ID. The process is repeated until each sister has been checked or until the RQST is completely satisfied.

5. ARRANGE IN CREWS. The WSR-Queue ID and RQST ID (D1) are passed to the arrange crews function (F-ARRCRU) which builds crews from the available personnel (D4). After locating the RQST, F-ARRCRU counts the maximum number of full crews that can be made from the personnel available (D4). If the count is less than the required number of crews, the crews are redistributed into minimum-sized crews and recounted. The crews are arranged into both full and minimum-size to best achieve the required number of crews. The available crews and the available and allocated personnel (D4) are updated and the number of crews returned to the caller.

6. DETERMINE ASSIGNED. The available personnel are allocated to crews.

a. CHECK AVAILABLE. The number of crews (systems) requested is compared to the updated crews available. If the number available exceeds the number requested, the requested number of crews will be assigned; if not, the total available number will be assigned instead (D5b).

b. ALLOCATE ASSIGNED. The personnel to be allocated (i.e., the assigned (D6a) are removed from the available personnel and required personnel, added to the allocated personnel (D4), and recorded in the assignment (D5b) by category. The number of crews created (D6a) are removed from the systems required and added to the crews available (D4) by weapon system.

F-OLWSR (cont.)

c. CHECK LEFTOVERS. Once the RQST has been completely satisfied, a check is done to ensure that no personnel remain in the WSR-Queue (D6c). If any personnel are left after the last crew has been formed, they are returned to the R-POOL (S3) and the R-Demand is updated (D5a).

7. TRANSFER PERSONNEL. The transfer personnel action (A-TRANSPER) is invoked using the delivery point (D1), assigned personnel, and RQST ID (D4) as parameters. The personnel are removed from the personnel assignment (D5b) and transferred to the delivery location (D1b) to join the weapon systems.

8. RETURN. The number and type of crews (D6a,b) are returned to the calling routine.

E-F9 F-FILLWS TYPE: Interactive Function

SUMMARY: When personnel have been added to a replacement pool (R-POOL) inventory, F-FILLWS is called to fill the WS requests (RQSTs) remaining in the R-POOL's WSR-Queue. For each RQST, the size of its current shortfall is calculated and the R-POOL demand is adjusted to reflect it. F-SUPPER is invoked to fill the RQST by checking the WS-Customer, The R-POOL, and the WS-Customer's sister units for excess personnel. F-ARRCRU is then called to build crews and update the RQST.

TRIGGERED BY:	F-DISPER	(E-F3)
RESULTING IN:	F-SUPPER	(E-F10)
	F-ARRCRU	(E-F12)
	R-POOL Demand updated	

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-20.

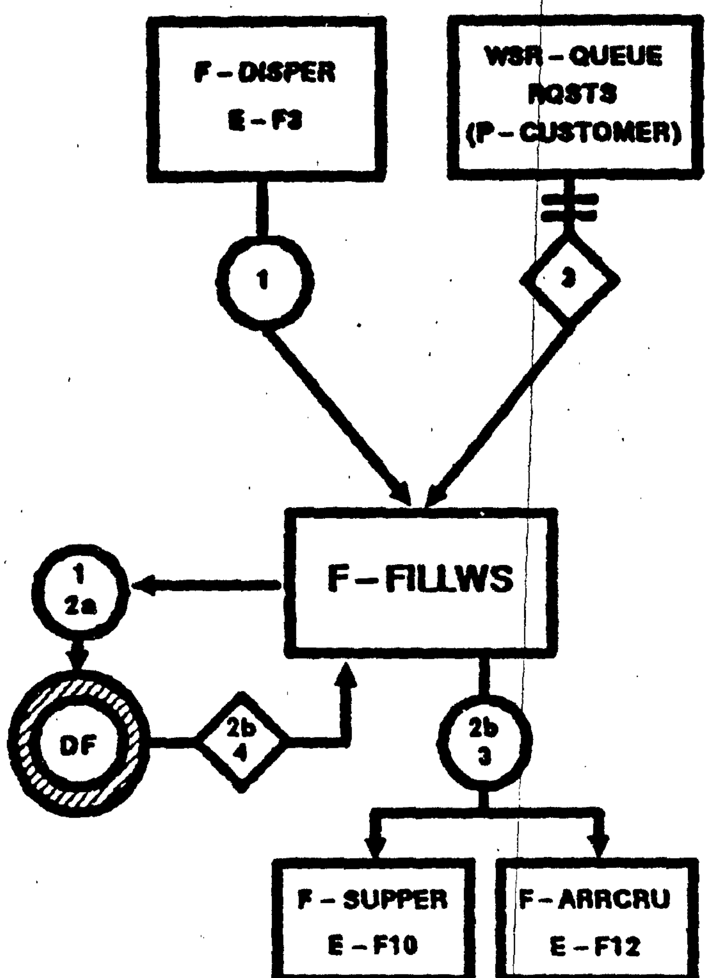

Figure E-20. F-FILLWS SSD

DATA DEFINITION: F-FILLWS

Connection Number	Data Transferred	Comments
D1	o R-POOL ID	The ID of the R-POOL needed to locate the WSR-Queue and the R-POOL demand.
D2a	o Shortfall	The number of personnel in each category still needed to fill the requirements.
D2b	o WSR-Queue ID	The ID of the queue attached to the R-POOL (E-DF9).
D3	o WSR-Queue	The temporary RQST holder containing the following (E-DF9):
	o RQST ID	The allocation ID from supply.
	o WS-Customer ID	The weapon system customer.
	o Systems required (number and type)	The number of each type of system remaining in the request.
	o Personnel required	The number of each category required to fill the remaining request.
	o Personnel available	The number of each category already obtained.

DATA DEFINITION: F-FILLWS (cont.)

Connection Number	Data Transferred	Comments
D3 cont.	o Personnel allocated	The number of each category already assigned to crews.
	o Crews available	The number of each type of crew already formed.
D4	o R-POOL demand	The total personnel requirement in the R-POOL during the current period (E-DF7).

E-F9

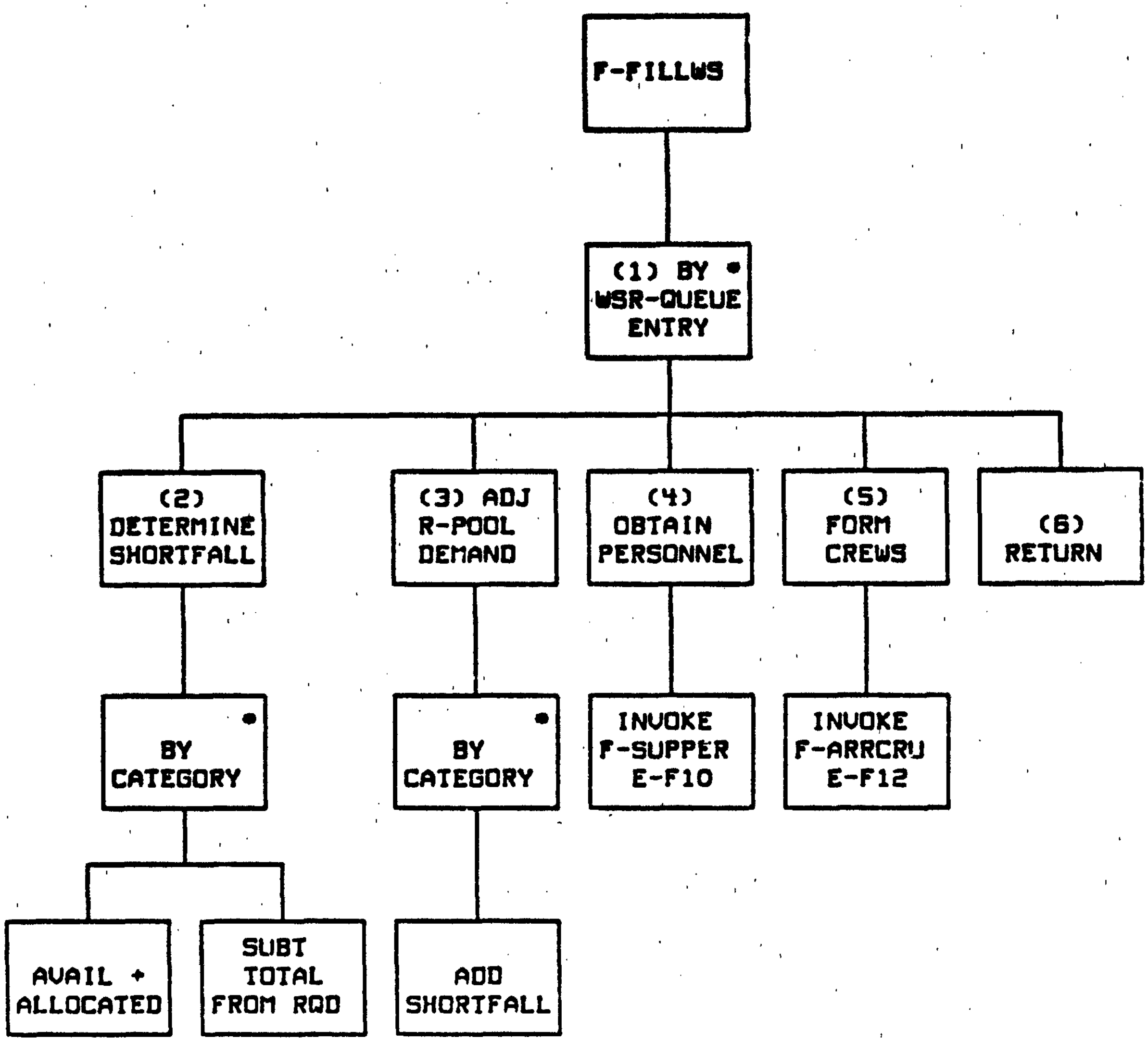

Figure E-21. F-FILLWS generator

E-F9

GENERATOR DESCRIPTION: F-FILLWS

1. CHECK QUEUE. The WSR-Queue is located using the R-POOL ID (D1) and an unfilled WS request is obtained from the queue (D3).

2. DETERMINE SHORTFALL. The available personnel and the allocated personnel (D3) in each category are added together and the result subtracted from the required personnel in order to obtain the current shortfall (D2a).

3. ADJUST R-POOL DEMAND. The current shortfall (D2a) is added to the current R-POOL demand (D4).

4. INVOKE F-SUPPER. The supply personnel function (F-SUPPER) is invoked using the RQST ID (D3) and the WSR-Queue ID (D2b). It obtains personnel from the WS-Customer, the R-POOL, and WS-Customer's sisters (units under the same brigade and/or sharing the same distribution point) and updates the available personnel (D3).

5. INVOKE F-ARRCRU. The arrange crews function (F-ARRCRU) is invoked using the RQST ID (D3) and the WSR-Queue ID (D2b). It builds crews by allocating the personnel available and updates the WSR-Queue elements (D3).

6. RETURN. (NOTE: Currently, supply is not being notified as soon as a RQST is filled. Instead, RQSTs filled during F-FILLWS remain in the queue until supply triggers F-OLWSR. An alternative method of handling filled RQSTs would be to pass the necessary information (e.g., RQST ID, status flag) to supply whenever a RQST is filled. Then supply would be able to reevaluate its requirements.)

E-F10 F-SUPPER TYPE: Interactive Function

SUMMARY: The supply personnel function (F-SUPPER) is called when it is necessary to locate personnel to man the systems in a WSRO process. The number and types of personnel required have been determined by F-CALPER. F-SUPPER obtains personnel from the WS-Customer, the R-POOL, and, if still necessary, the WS-Customer's sister units in order to meet the requirement.

TRIGGERED BY:	F-NUSWR	(E-F7)
	F-FILLWS	(E-F9)
RESULTING IN:	F-LOCPER	(E-F13)
	F-CHKCUS	(E-F11)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-22.

E - F10

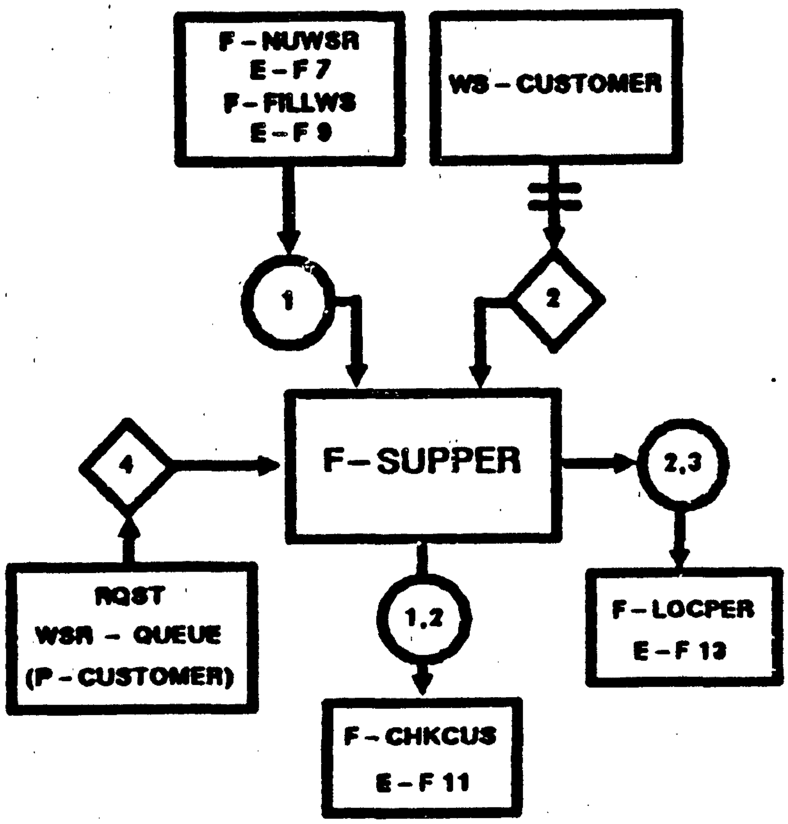

Figure E - 22. F - SUPPER SSD

E-F10

DATA DEFINITION: F-SUPPER

Connection Number	Data Transferred	Comments
D1	o WSR-Queue ID	The location holding the RQST.
	o RQST ID	The SUPPLY or F-PEREP allocation ID.
S2	o WS-Customer state vector	
	o Personnel inventory	The customer's personnel, by category.
	o R-POOL ID	ID of the customer's assigned R-POOL.
	o Sister unit IDs	The IDs of the units belonging to the same brigade or sharing the same distribution point as the customer.
D3	o WSR-Queue	E-DF9.
	o Available personnel	Personnel not yet allocated to crews.
	o Required personnel	Number of each category required.
	o WS-Customer ID	The P-CUSTOMER's unit ID.

E-F10

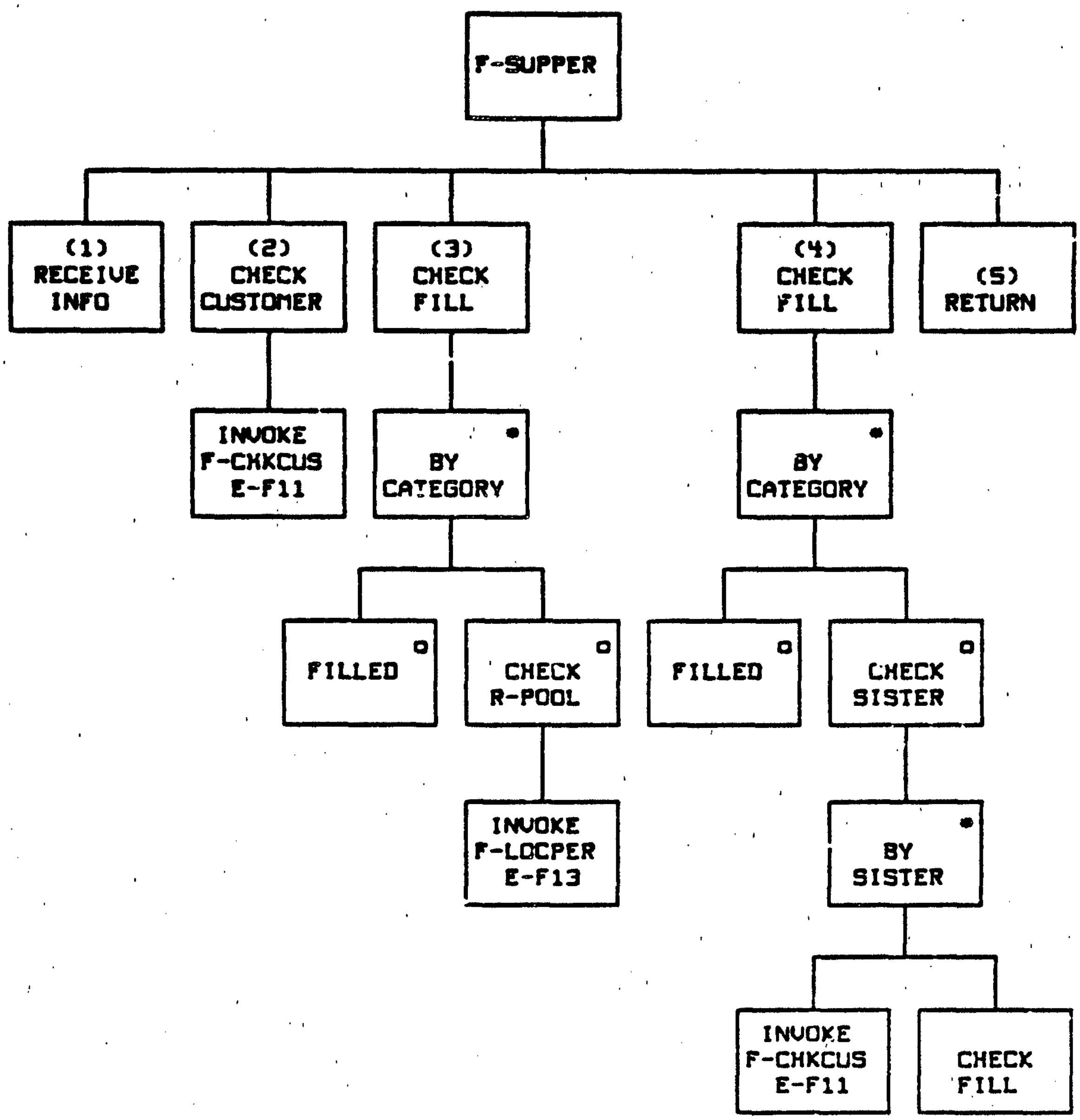

Figure E-23. F-SUPPER generator

E-F10

GENERATOR DESCRIPTION: F-SUPPER

1. RECEIVE INFORMATION. The calling routine passes the WSR-Queue ID and RQST ID (D1).

2. CHECK CUSTOMER. Personnel are obtained from the WS-Customer using the WSR-Queue ID, RQST ID (D1), and WS-Customer ID (D4) to invoke F-CHKCUS. F-CHKCUS will add the personnel obtained to the RQST (D3), update the R-POOL demand, and return.

3. CHECK FILL. Each category in available personnel (D3) is checked to see if the requirement has been filled. If one category is still unfilled, the R-POOL is checked for personnel by invoking the function, F-LOCPER. Parameters required include the R-POOL ID (S2) and the required personnel (D3).

4. CHECK FILL. Each category is again checked until an unfilled one is located. Then, the WS-Customer sister units are accessed, one at a time, by invoking F-CHKCUS using the queue ID, RQST ID (D1) and sister ID (S2).

5. RETURN. When all the units have been checked or when the requirement has been filled, the routine returns.

E-F11 F-CHKCUS TYPE: Interactive Function

SUMMARY: The check customer function is called when a unit must be evaluated and the excess personnel located for reassignment (e.g., as in a WSRO process). F-CHKCUS sets up the parameters needed by the check inventory function (F-CHINV) and calls it. The personnel returned are transferred to the holding location and the R-POOL demand is adjusted to reflect the new level of demand.

TRIGGERED BY:	F-SUPPER	(E-F10)
	F-OLWSR	(E-F8)
RESULTING IN:	P-CUSTOMER	
	A-TRANSPER	(E-A1)
	F-CHINV	(E-F4)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-24.

E - F11

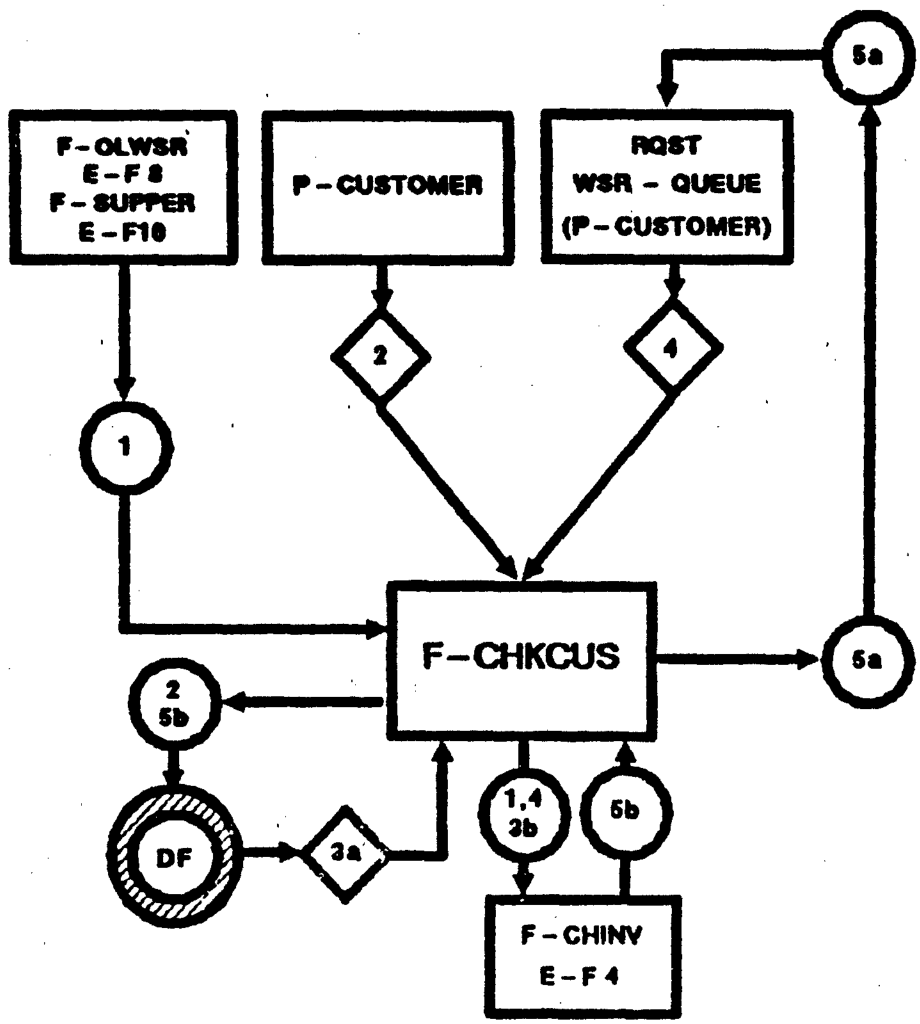

Figure E - 24. F-CHKCUS SSD

E-F11

DATA DEFINITION: F-CHKCUS

Connection Number	Data Transferred	Comments
D1	o WSR-Queue ID	The location holding the RQST.
	o RQST ID	The supply or PEREP allocation ID.
	o P-CUSTOMER ID	ID of the unit to be evaluated for personnel (e.g., the customer or a sister unit).
S2	o P-CUSTOMER state vector	The unit being evaluated for personnel.
	o Personnel inventory	The unit's personnel, by category.
	o R-POOL ID	Unit ID of the assigned R-POOL.
D3a	o R-POOL demand	The current demand against the R-POOL (E-DF7).
D3b	o Required response	The response from F-CHINV: excess personnel.
D4	o WSR-Queue	E-DF9.
	o RQST ID	(D1)
	o WS-Customer ID	The RQST customer's unit ID.
	o Systems required	The number of each type of system required.
	o Available personnel	The personnel not yet allocated to crews.

E-F11

DATA DEFINITION: F-CHKCUS (cont.)

Connection Number	Data Transferred	Comments
D5a	o Personnel obtained	Personnel to be added to the available personnel.
D5b	o Excess count	The number of excess personnel in each category returned by F-CHINV.

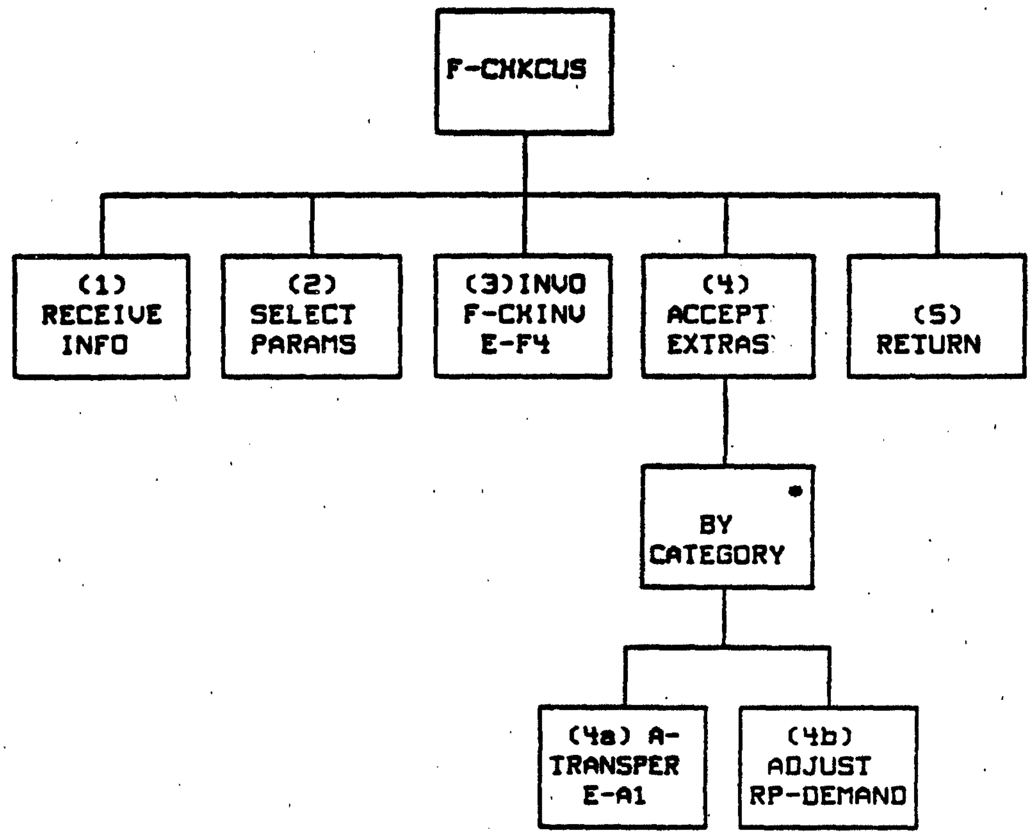

Figure E-25. F-CHKCUS generator

E-F11

GENERATOR DESCRIPTION: F-CHKCUS

1. RECEIVE INFORMATION. F-CHKCUS is called using the parameters listed in D1.

2. SELECT PARAMETERS. The parameters needed for F-CHINV are the P-CUSTOMER ID (i.e., the unit being evaluated, D1), the systems specified (D4), and the type of value to be returned (D3b). Here, F-CHINV will be used to determine the number of extra personnel in each of the required categories (D5).

3. INVOKE F-CHINV. The check inventory function evaluates the personnel inventory of the designated P-CUSTOMER and determines the number of full crews available, the number of replacements required to fill out crews for available systems, and the number of extra personnel available for reassignment. F-CHINV is invoked here to locate possible extras for reassignment to crews in the WSRO process.

4. ACCEPT EXTRAS. The extra personnel (D5) located at the unit must be transferred and accounted for.

a. INVOKE A-TRANSPER. The personnel are moved by invoking the transfer personnel action. The WSR-Queue (D4) is considered a P-CUSTOMER and the personnel are transferred to its inventory as available personnel (D4).

b. ADJUST R-POOL DEMAND. The demand on the R-POOL (D3a) must be adjusted downward to account for the personnel no longer in demand and the number of extras obtained (D5) are subtracted, category by category.

5. RETURN.

E-F12

E-F12 F-ARRCRU TYPE: Interactive Function

SUMMARY: The arrange crews function (F-ARRCRU) builds crews for the specified systems from the available personnel in a ROST. The number of each category required for one crew is obtained from the system/crew table. F-ARRCRU determines how many crews, of maximum and minimum size, can be made with the available personnel and then allocates the personnel required to man those crews.

TRIGGERED BY:	F-NUSWR	(E-F7)
	F-OLSWR	(E-F8)
	F-FILLWS	(E-F9)

RESULTING IN: Organization of personnel into crews.

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-26.

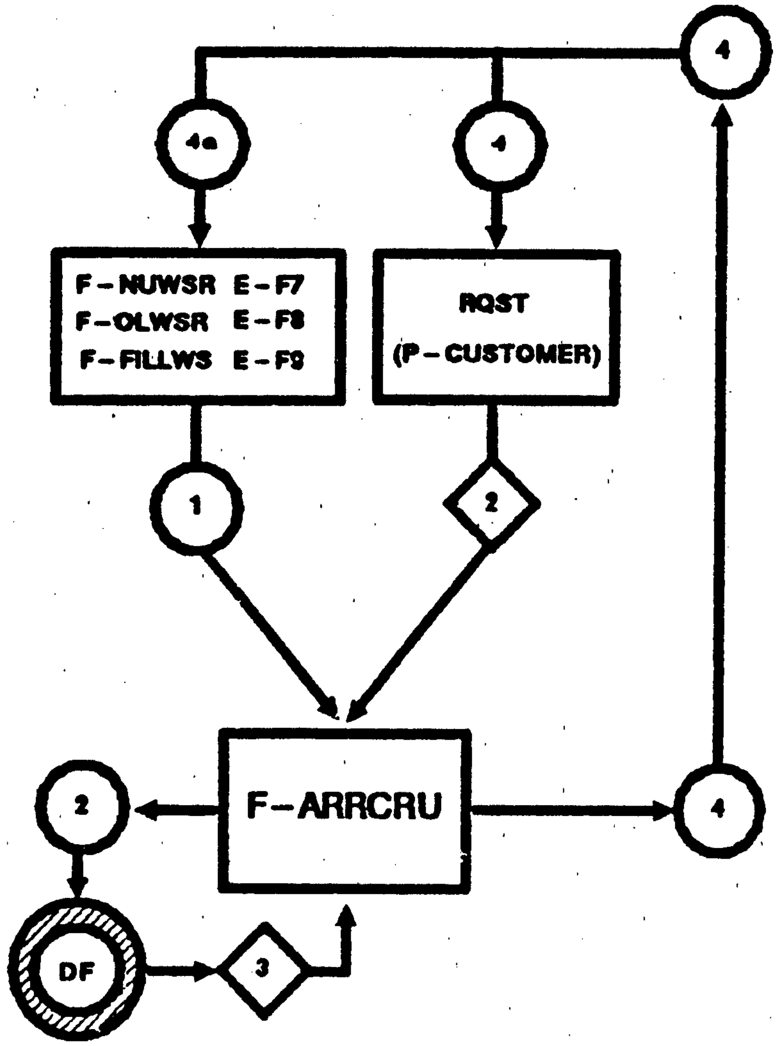

Figure E-26. F-ARRCRU SSD

DATA DEFINITION: F-ARRCRU

Connection Number	Data Transferred	Comments
D1	o WSR-Queue ID	The ID of the queue in which the RQST resides. Note that the queue is treated as a P-Customer in this function.
	o RQST ID	The supply or PEREP allocation ID.
S2	o WSR-Queue	E-DF9.
	o Required systems	The number of each type of weapon system specified.
	o Available personnel	The personnel assigned to the RQST but not yet allocated to a crew.
	o Allocated personnel	The location for personnel who have been assigned to a crew.
	o Available crews	The crews with personnel allocated.
D3	o System/crew table	A table showing the crew breakdown (category and number) for each system/task (E-DF1).
D4a	o Crew count	The number of newly formed crews of each system type.
D4b	o Personnel assigned	The number of each catagory newly allocated to a crew.

E-F12

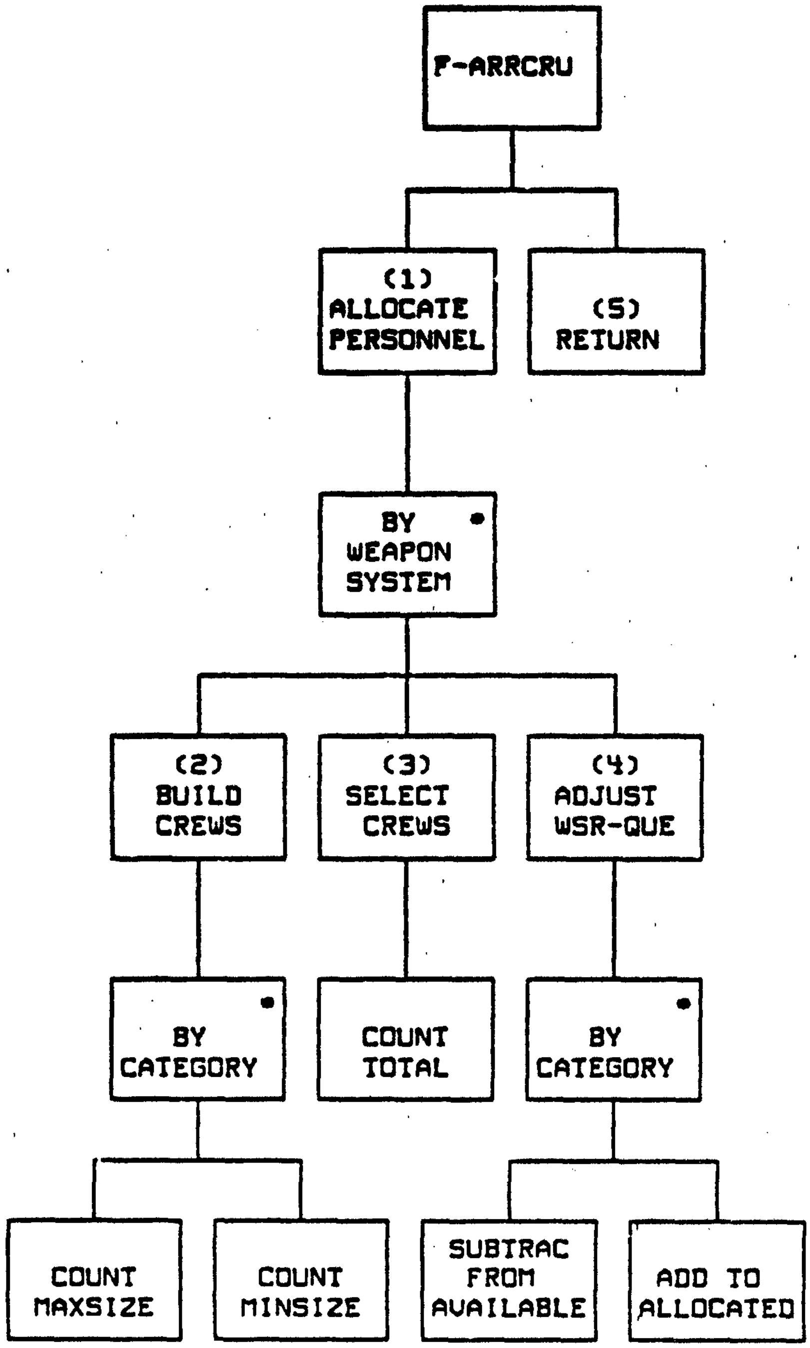

Figure E-27. F-ARRCRU generator

GENERATOR DESCRIPTION: F-ARRCRU

1. ALLOCATE PERSONNEL. The ROST is located using the information passed in D1. The available personnel must be formed into crews, system-by-system (S2).

2. BUILD CREWS. The crew table (D3) is accessed and, for each required personnel category (S2), the number of crews possible, of both maximum strength and minimum strength, are counted.

3. SELECT CREWS. When all required personnel categories for the system have been checked, the maximum number of crews to be assigned, less than or equal to the number required (D2), is selected.

4. ADJUST WSR-QUEUE. The personnel to man the new crews are allocated and the number of crews available is updated (D4).

5. RETURN. The number of crews available (D4a) is returned to the calling routine.

E-F13

E-F13 F-LOCPER TYPE: Interactive Function

SUMMARY: The locate personnel function (F-LOCPER) accesses an R-POOL inventory searching for personnel to fill a requirement/request (RQMT/RQST). Each personnel category needed is checked in turn: if not enough personnel of the same category are available, a substitution table is used to determine alternative categories. When personnel are located, they are transferred to the assignment by A-ASSPER. When the requirement of one category has been either satisfied or the alternatives exhausted, the next category in the RQMT/RQST is checked.

TRIGGERED BY:	F-PEREP	(E-F1)
	F-SUPPER	(E-F10)
RESULTING IN:	R-POOL	
	A-ASSPER	(E-A2)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure E-28.

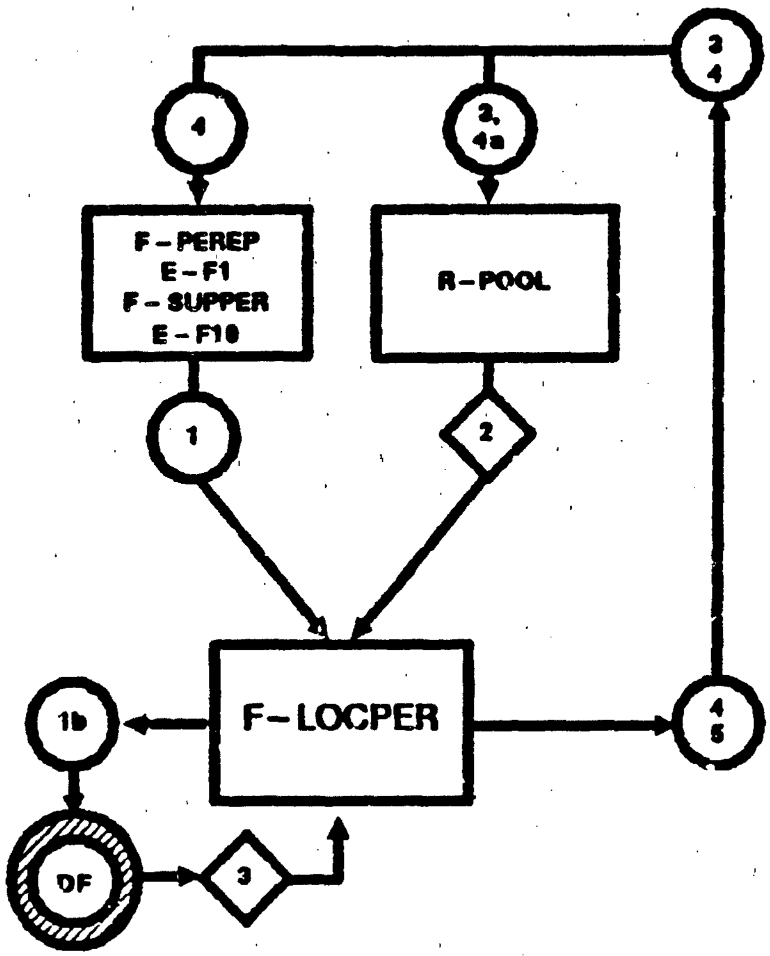

Figure E-28. F-LOCPER SSD

E-F13

DATA DEFINITION: F-LOCPER

Connection Number	Data Transferred	Comments
D1	o R-POOL ID	Location of inventory to obtain personnel from.
	o Required personnel	The number of each personnel category required to fill the RQMT/RQST.
S2	o R-POOL state vector	
	o R-POOL inventory	
D3	o Substitute category	An alternative category supplied by the substitution table (E-DF4).
D4a	o Assigned personnel	The number of personnel assigned in each category.
D4b	o Remaining requirement	The number in each category not supplied.

E-F13

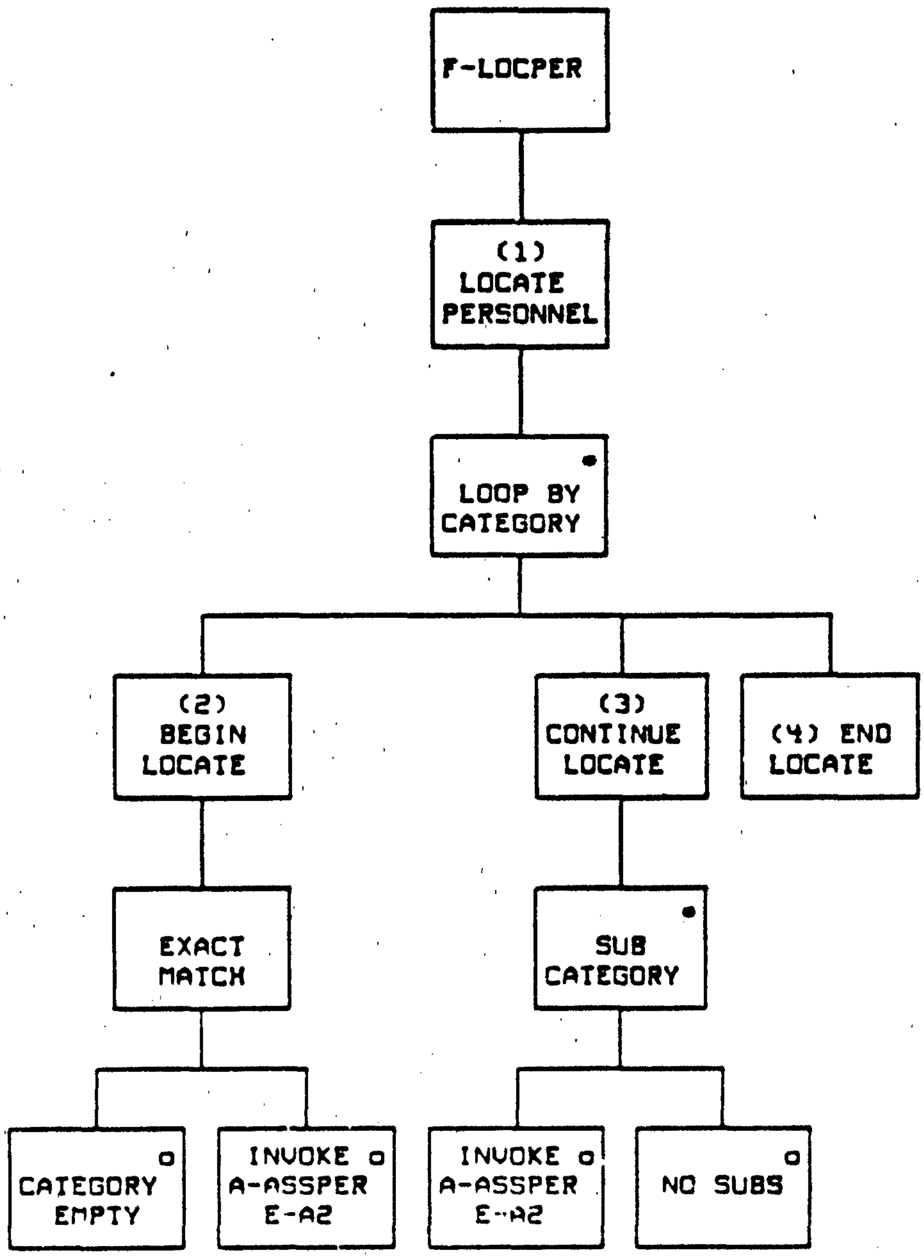

Figure E-29. F-LOCPER generator

E-F13

GENERATOR DESCRIPTION: F-LOCPER

1. LOCATE PERSONNEL. The required personnel (the number and category) and the R-POOL ID are passed by the calling routine (D1). Each category is handled in turn.

2. BEGIN LOCATE. The R-POOL inventory is accessed and the specified category is checked (S2). If not empty, the number required, the category, and the R-POOL ID are passed to A-ASSPER (E-A2). A-ASSPER will update the R-POOL inventory by removing personnel for the assignment. The number assigned and the number remaining (in the requirement) are returned (D4).

3. CONTINUE LOCATE. If the category is not satisfied, a substitution table is accessed, using the category as a parameter (D1b). An alternative category is returned (D3) and is checked as above: if not empty, the number required (i.e., the number remaining (D4)), the category (i.e., the alternative category (D3)), and the R-POOL ID are passed to A-ASSPER and the number assigned and the number remaining are returned. The returning values are used to update the required category results in D4. If the requirement is not completely filled, another substitute category can be sought.

4. END LOCATE. When the category's requirement has been either satisfied or all alternatives exhaused, another category is obtained from the requirement. The process continues until all categories in the requirement have been addressed.

E-F14 F-LOADPER TYPE: Interactive Function

SUMMARY: This function is triggered by the transportation module whenever it arrives at an R-POOL to pick up personnel. The function obtains the transport unit ID, objective location, and the supplier (R-POOL) ID from the calling routine and locates the proper personnel assignment (ASSGN) in the R-POOL W-Queue (by checking the objective location). It then triggars A-TRANSPER to transfer the personnel assignment from the W-Queue to the transporter. Once the personnel are loaded, F-TRANSP-DECIDE is triggered so the transporter can decide what to do next.

TRIGGERED BY:	F-ATOBJ-GND	(C-F10)	Transportation
	F-ATOBJ-AIR	(C-F11)	Transportation
RESULTING IN:	P-CUSTOMER		
	A-TRANSPER	(E-A1)	
	F-TRANSP-DECIDE	(C-F15)	Transportation

SYSTEM SPECIFICATION DIAGRAM:
See figure E-30.

E-F14

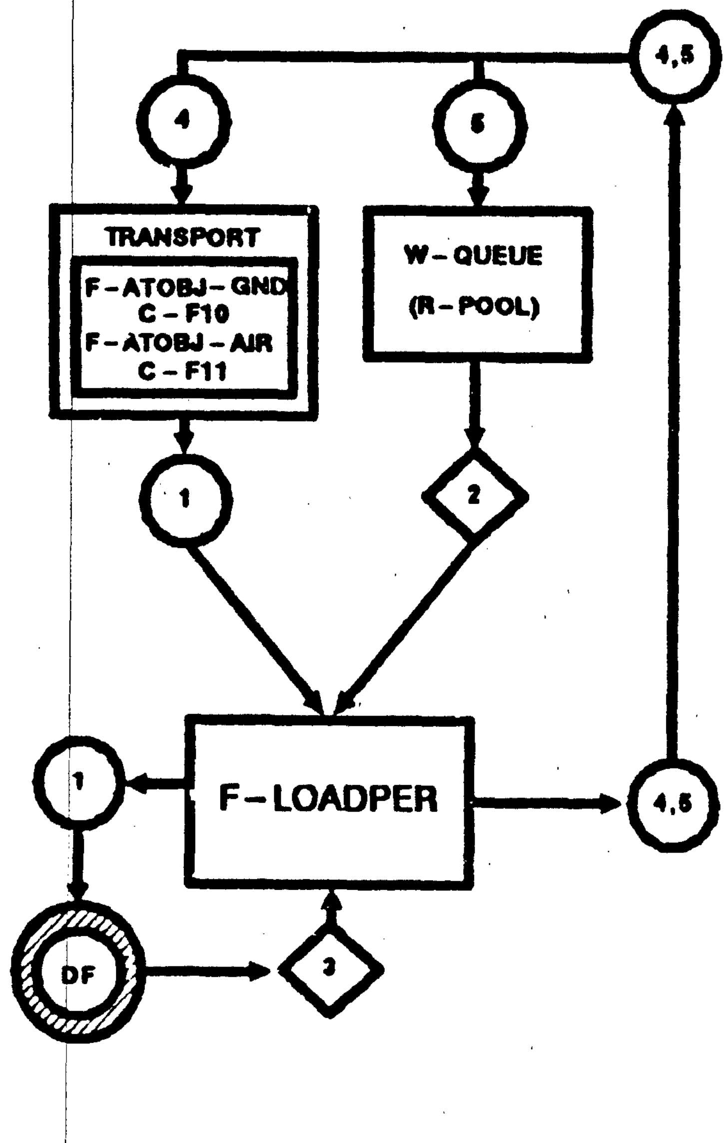

Figure E-30. F-LOADPER SSD

E-F14

DATA DEFINITION: F-LOADPER

Connection Number	Data Transferred	Comments
D1	o R-POOL ID	The supplier unit ID.
	o Transporter ID	The receiving unit ID.
	o Objective location	The distribution point ID.
S2	o W-Queue	E-DF8.
	o ASSGN ID	
	o Distribution point ID	The objective location.
	o Distribution count	The total number of personnel to be transported at this time.
	o Mode of transport	Implicit/explicit enroute/waiting.
D3	o W-Queue ID	E-DF8.
D4	o Cancel flag	Needed when the ASSGN no longer exists.
D5	o Transporter ID	(D1)
	o Objective location	(D1/S2)
	o Distribution count	(S2)

E-F14

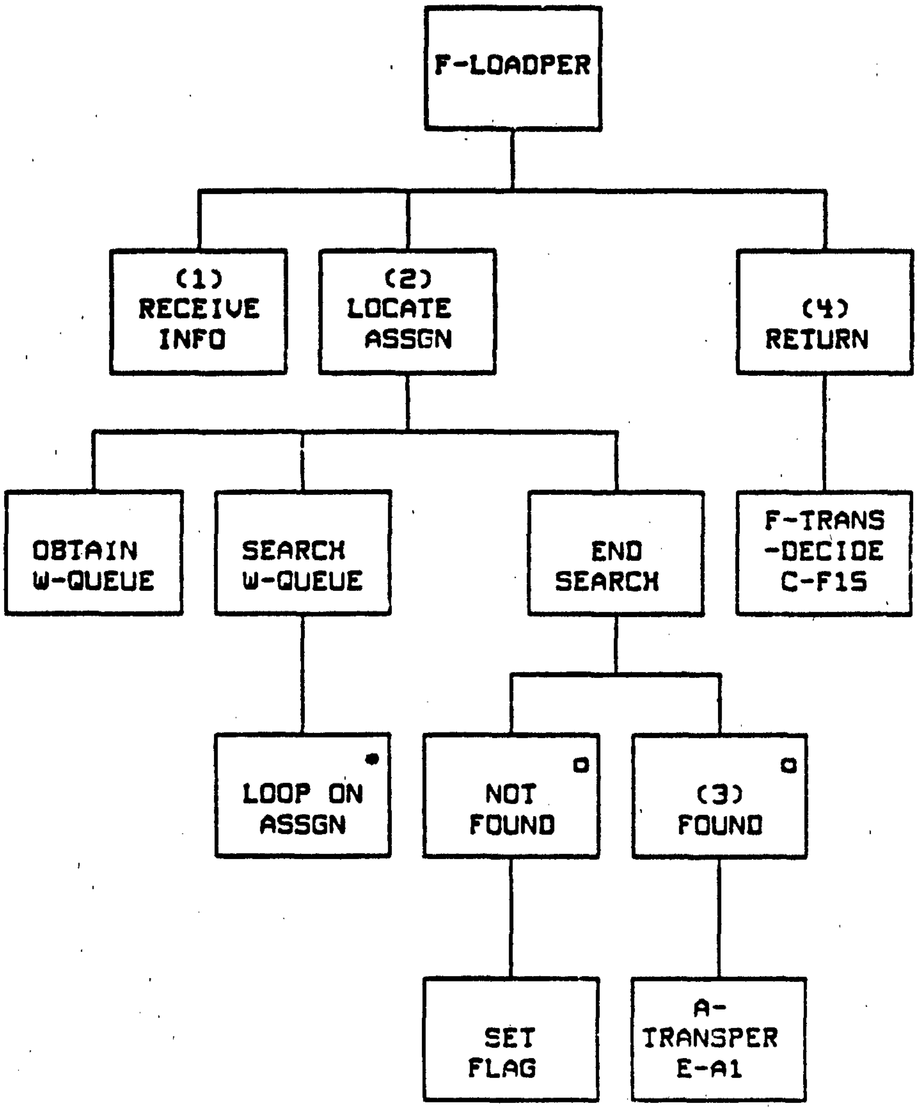

Figure E-31. F-LOADPER generator

GENERATOR DESCRIPTION: F-LOADPER

1. RECEIVE INFORMATION. The R-POOL unit ID, distribution point ID, and transporter ID (D1) are obtained from the calling routine.

2. LOCATE ASSGN. The R-POOL ID (D1) is used to obtain the W-Queue ID (S3) and the W-Queue's ASSGNs are searched for a distribution point ID which matches the transporter's (D1). If none exists, the transporter is so notified (D4).

3. TRANSFER PERSONNEL. When the ASSGN is located, the personnel allotment is transferred to the transporter by the A-TRANSPER action using the W-Queue (holding unit) ID (D3), the ASSGN ID, allocated personnel (S2), and transporter ID (receiving unit) (D1) as parameters.

4. RETURN. When the transfer is completed, F-TRANSP-DECIDE (C-F15) is triggered using the parameters listed in D5.

APPENDIX F

MEDICAL AND MAINTENANCE

The medical and maintenance appendix includes the sections listed below. Note that reference numbers are coded to indicate both the functional area (the appendix letter [F] is used) and the type (E = entity, A = action, F = function) involved. Thus, F-A1 refers to the first action listed in medical and maintenance (appendix F). For information on the JSD diagram notation discussed, see appendix A.

1. Entity list. The entity list contains the reference number, the name, and the definition (summary and attributes) of each entity used in medical and maintenance.

2. Action list. The action list contains the reference number, the name, and the definition (summary, attributes, generators, and associated entities) of each action belonging to the entities in medical and maintenance.

3. Entity-action diagrams and cross-reference table. The cross-reference table provides a mapping of entities and actions. One JSD entity-action structure diagram is provided for each entity. Following each diagram is a narrative description of each action shown.

4. Generator function list. The function list contains the reference number, name, and definition (summary, triggering mechanisms, and resulting actions) of each function associated with medical and maintenance. More complete information on each function is contained in the annex.

5. Annex. The contents of the annex are as follows:

a. Dispatcher. The dispatcher serves as a road map to the functions. It is not a JSD structure diagram, but it is presented in tree form to show the hierarchical nature of the structure involved. The root of the tree is the dispatcher. The top-level nodes (boxes) identify the critical events occurring in medical and maintenance and the subsequent nodes (boxes) identify the functions (and show the interrelationships) involved. The calling routines and triggering mechanisms for each critical event are listed above event node. The actions and events caused by a function are listed below the function node. Each critical event is numbered for identification purposes only; no ordering is implied. The event scheduler (SCHED) uses the critical event numbers to identify the event being scheduled by a function.

5. Annex (cont.)

b. Functions. The following information is provided for each function belonging to medical and maintenance. Note that the reference number of the function (e.g., F-F1) appears at top of each page.

(1) Function summary. The function summary contains the reference number, name, and definition of a function. The definition contains a summarized narrative, a list of the mechanisms which can trigger the function, and a list of the actions and functions which can result from the function.

(2) System specification diagram (SSD). The SSD is a JSD structure diagram of the data flow to and from a specified function. It shows the static relationships among the entities and functions involved. No calling sequence or hierarchical relationship is implied. In addition to the standard JSD SSD notation (see appendix A), special notation has been adopted to indicate ownership. A single box is used to denote a function or entity belonging to the specified area (e.g., medical and maintenance). Plain double boxes indicate functions belonging to another CSS area. The area is identified in the outer box and the functions involved are listed in the inner box. Patterned double boxes (diagonal slashes in the outer box) indicate functions belonging to the host model. Whenever possible, the particular module is specified in the inner box (e.g., chemical, movement). A timer is considered part of the CSS module and is represented by a plain double circle; data files (DF) will belong to the entire model and are depicted by a patterned double circle. Note that although more than one data file (or timer) may be used by the specified function, only one representation (circle) will appear in the diagram. The individual data files and timers will be identified in the corresponding data definition table.

(3) Data definition. This table provides a listing of the data elements and structures required for the specified function. The connection numbers correspond to the data flow numbers shown on the SSD. A "D" or "S" is added to distinguish between data and state vector elements. Detailed descriptions of the data files involved can be found in appendices J and K.

(4) Generator diagram. The generator diagram is similar to the JSD entity-action diagrams described in paragraph 3 above. Each node (box) depicts either an iteration, a selection, or a sequential step required by the process.

(5) Generator description. The generator description provides a detailed narrative of the function process. Step numbers correspond to the box numbers shown on the associated generator diagram. (Note that not all boxes are assigned a number.) Data elements cited refer to the data listed in the associated data definition table.

1. ENTITY LIST.

F-E1 REPAIR-JOB

SUMMARY: This entity models the life of damaged systems, failed systems, wounded personnel, and diseased non-battle injured (DNBI) personnel. The life of the entity reflects user-defined sequences of movements (recovery and evacuation) and repair/treatment actions required to transform the systems/personnel back into an operational state. The number of unique repair job types to be represented will be a user-defined model input. The actual life of the entity (i.e., where it is repaired, when it is repaired, where it is moved, when it is moved) is all dynamic and a function of the repair job type as well as the total workload on the repair organizational aspects of the repair organization. Additional definition of some of the attributes listed below can be found in the appendix J description of Repair Job Templates F-DF11.

ATTRIBUTES:

RJ-ID	RJ-Type
RJ-Qty	Current-Repair-Site
System-Type	RJ-Creation-Time
Current-RA (pointer to RA list)	
Ex-Parts-Avail(PT)**	
Evac-Flag	Move-Action-Flag
Contaminated-Flag	Unrecovered-Flag
Mobility-Flag	Personnel-RJ-Flag
Repair-Progress-Flag	Unit-Accountable-Flag
Evac-Destination	
Convoy-ID	RAs**
RA-Type	RA-Time-Remaining
Critical/Fatal-RA-Start-Time	
RH-Req(RT)**	Parts-Req(PT)**

** indicates zero or more instances of the variable

F-E2 BOOKKEEPER

SUMMARY: This entity models the assets belonging to each unit played in the model (i.e., the systems, personnel, and parts that can be utilized in repair). The repair module will consume parts and decrease assigned and/or OH counts based on damage/patient assessment and evacuation actions. The repair module will increase OH counts of systems/personnel when returning some directly to the unit from the repair system. The assets of a unit will also be used in determining its capability to recover, evacuate, and repair systems.

ATTRIBUTES:

Parts-Balance (Part-Type)
Assigned-Qty (System/Personnel-Type)
OH-Qty (System/Personnel-Type)

[NOTE: The model implementor should note that the attributes of this entity must be shared with other modules. Supply must be able to add to all the attribute values. Personnel must be able to add to the personnel counts. Attrition must be able to subtract from the values. The design of the state vector and data structures for this entity should be done with this in mind. Also if a similar entity already exists in the host model with a defined data structure and operations corresponding to the actions of this entity, perhaps it could be used directly or modified.]

2. ACTION LIST.

F-A1 CREATE REPAIR-JOB (A-CREATE-RJ)

SUMMARY: This action sets up the REPAIR-JOB (RJ) as an entity by performing the initialization of all of the repair-job attributes.

ATTRIBUTES:	RJ-Type-Template	[F-DF11]
	RJ-Type	
	Personnel-Type	[if personnel]
	RJ-Qty	
	Unit-ID	[if system]
	or Repair-Site-ID	[if personnel]
	RJ-Creation-Time	
	Contaminated-Flag	
GENERATOR:	F-TRANSFORM	(F-F3)
	F-RAM/DNBI-INIT	(F-F4)
	F-BATTLE-EFFECT	(F-F5)
ENTITY:	REPAIR-JOB (F-E1)	

F-A2 PASSBACK UNRECOVERED RJ (A-PASSBACK-RJ)

SUMMARY: This action removes a quantity considered to be the expected value quantity that fell behind unit lines into the division rear on an advance while engaged with the enemy. The remaining quantity is used to adjust the resource requirements for accomplishing the repair actions.

ATTRIBUTES:	RJ-Type-Template (F-DF11)	
	RJ-ID used to identify REPAIR-JOB Passback-Qty	
GENERATOR:	F-BATTLE-EFFECT	(F-F5)
ENTITY:	REPAIR-JOB	(F-E.

F-A3 COMBINING FRACTIONAL RJs IN SAME STATE (A-COMBINE-RJ)

SUMMARY: This action is used to include fractional quantities of RJs in the same state of repair to the current RJ. The new RJ quantity is used to adjust the resource requirements needed to accomplish the repair actions.

ATTRIBUTES: RJ-Type-Template (F-DF11)
RJ-ID used to identify REPAIR-JOB
Additional-Qty

GENERATOR: F-TRANSFORM (F-F3)
F-RAM/DNBI-INIT (F-F4)
F-BATTLE-EFFECT (F-F5)

ENTITY: REPAIR-JOB (F-E1)

F-A4 CONTAMINATION OF UNCONTAMINATED RJ (A-CONTAMIN-RJ)

SUMMARY: This action calculates the increased resource time required to accomplish repair actions on a contaminated RJ.

ATTRIBUTES: RJ-Type-Template (F-DF11)
RJ-ID

GENERATOR: F-CONTAMIN-EFFECT (F-F9)

ENTITY: REPAIR-JOB (F-E1)

F-A5 REMOVE PARTS FOR EXCHANGE (A-EXCHANGE-PARTS)

SUMMARY: This action changes the RJ attributes to reflect the removal of operational parts to repair another RJ. It reduces the remaining exchange parts available that could be used on another RJ and adds the removed parts to the parts requirements list needed to ultimately repair the job.

ATTRIBUTES: Ex-Parts-Qty (PT)
RJ-ID

GENERATOR: F-REP-RES-ALLOC (F-F1)

ENTITY: REPAIR-JOB (F-E1)

F-A6 HOLD MOVE CLASSIFICATION (A-CLASSIFY-RJ)

SUMMARY: This action is used to tag the RJ for evacuation from or for holding at its current repair site.

ATTRIBUTES: Evac Destination or Hold flag

GENERATOR: F-H/M-ASSESS (F-F2)

ENTITY: REPAIR-JOB (F-E1)

F-A7 REPAIR PROGRESS (A-PROGRESS-RJ)

SUMMARY: This action shows the changes to the repair job caused by the allocation of resources and time. The allocated resources and time are deducted from the current repair action requirements. If the current repair action is completed based on the allocations, then either the next repair action is set for future allocations or, if all repair actions have been completed, the A-REPAIRED action is invoked to process the completed job.

ATTRIBUTES: RH-Alloc (RT) Time-Alloc
RJ-ID

GENERATOR: F-REP-RES-ALLOC (F-F1)

ENTITY: REPAIR-JOB (F-E1)

F-A8 RECOVER RJ (A-RECOVER-RJ)

SUMMARY: This action is used to register the recovery of a repair job by its unit repair site.

ATTRIBUTES: RJ-ID

GENERATOR: F-RECOVERY (F-F6)
F-RECOVERY-SUPPORT (F-F7)
F-RECOVERY-SHORT (F-F3)

ENTITY: REPAIR-JOB (F-E4)

F-A9 RJ EVACUATION (A-EVACUATE-RJ)

SUMMARY: This action registers whether a repair job has departed to or arrived from an evacuation.

ATTRIBUTES: Repair-Site-Unit-Accountability-Flag (F-CC16)
RJ-ID
Arrival/Departure-Flag
Convoy-ID

GENERATOR:	F-EVAC-MANAGER	(F-F11)
	F-EVAC-RECEIVER	(F-F12)
ENTITY:	REPAIR-JOB	(F-E1)

F-A10 PATIENT DEATH (A-DIE-PRJ)

SUMMARY: Upon determination of death to the patient (i.e., REPAIR-JOB), this action notifies graves registration. If the patient was still at a level where unit accountability is maintained, then the death is prorated out to the supported units. The entity (RJ) life is then completed.

ATTRIBUTES:	RJ-ID	
GENERATOR:	F-REP-RES-ALLOC	(F-F1)
ENTITY:	REPAIR-JOB	(F-E1)

F-A11 RJ RETURN (A-RETURN-RJ)

SUMMARY: When all repair actions have been completed, this action returns the repaired system to either a unit, the personnel pool, or the supply system, depending upon where it is being returned from.

ATTRIBUTES:	RJ-ID	
GENERATOR:	A-PROGRESS-RJ	(F-A7)
ENTITY:	REPAIR-JOB	(F-E1)

F-A12 RJ ABANDONED (A-ABANDON-RJ)

SUMMARY: This action reflects the loss of repair jobs. If it is a fractional loss, the RJ quantity is reduced as are the repair resource requirements. If it is a total loss, the RJ life is ended.

ATTRIBUTES: RJ-Template (F-DF11)
RJ-ID
Abandoned-Qty

GENERATOR: F-BATTLE-EFFECT (F-F5)

ENTITY: REPAIR-JOB (F-E1)

F-A13 INVENTORY PARTS (A-INVENTORY-PARTS)

SUMMARY: Used to record the parts inventory remaining at a repair site after allocations have been made.

ATTRIBUTES: Unit-ID
Parts-Remaining (PT)

GENERATOR: F-REP-RES-ALLOC (F-F1)

ENTITY: BOOKKEEPER (F-E2)

F-A14 UNIT ASSIGNED STRENGTH LOSSES (A-ASSIGN-LOSS)

SUMMARY: This action reduces the assigned systems and personnel strengths of a unit due to RJ classification or evacuation beyond a given level of repair/treatment.

ATTRIBUTES: Unit-ID
Loss-Qty (System/Personnel Type)

GENERATOR: F-TRANSFORM (F-F3)
F-RAM/DNBI-INIT (F-F4)
F-BATTLE-EFFECT (F-F5)

ENTITY: BOOKKEEPER (F-E2)

F-A15 UNIT ON-HAND STRENGTH LOSSES (A-LOSE-OH)

SUMMARY: This action reduces the OH systems and personnel strengths of a unit due to assessment of RAM failures or DNBI.

ATTRIBUTES: Unit-ID
Loss-Qty (System/Personnel Type)

GENERATOR: F-RAM/DNBI-INIT (F-F4)

ENTITY: BOOKKEEPER (F-E2)

F-A16 UNIT ON-HAND GAINS (A-GAIN-OH)

SUMMARY: This action increases the OH systems and personnel strengths of a unit due to the direct return of repaired systems or treated patients.

ATTRIBUTES: Unit-ID
Gain-Qty (System/Personnel Type)

GENERATOR: F-RTNS-ALLOC (F-F10)

ENTITY: BOOKKEEPER (E-F2)

F-A17 EAC EVACUATION (A-EVAC-RJ-EAC)

SUMMARY: Used to recognize the start of evacuation of the RJ out of corps and hence the end of the entity life in the corps game.

ATTRIBUTES: RJ-ID
End-RJ-Entity-Life

GENERATOR: F-EVAC-MANAGER (F-F11)

ENTITY: REPAIR-JOB (F-E1)

3. ENTITY-ACTION CROSS-REFERENCE AND DIAGRAMS.

ENTITY		ACTION	
REPAIR-JOB	(F-E1)	A-CREATE-RJ	(F-A1)
		A-PASSBACK-RJ	(F-A2)
		A-COMBINE-RJ	(F-A3)
		A-CONTAMIN-RJ	(F-A4)
		A-EXCHANGE-PARTS	(F-A5)
		A-CLASSIFY-RJ	(F-A6)
		A-PROGRESS-RJ	(F-A7)
		A-RECOVER-RJ	(F-A8)
		A-EVACUATE-RJ	(F-A9)
		A-DIE-PRJ	(F-A10)
		A-RETURN-RJ	(F-A11)
		A-ABANDON-RJ	(F-A12)
		A-EVAC-RJ-EAC	(F-A17)
BOOKKEEPER	(F-E2)	A-LOSE-OH	(F-A15)
		A-INVENTORY-PARTS	(F-A13)
		A-GAIN-OH	(F-A16)
		A-ASSIGN-LOSS	(F-A[illegible])

F-E1

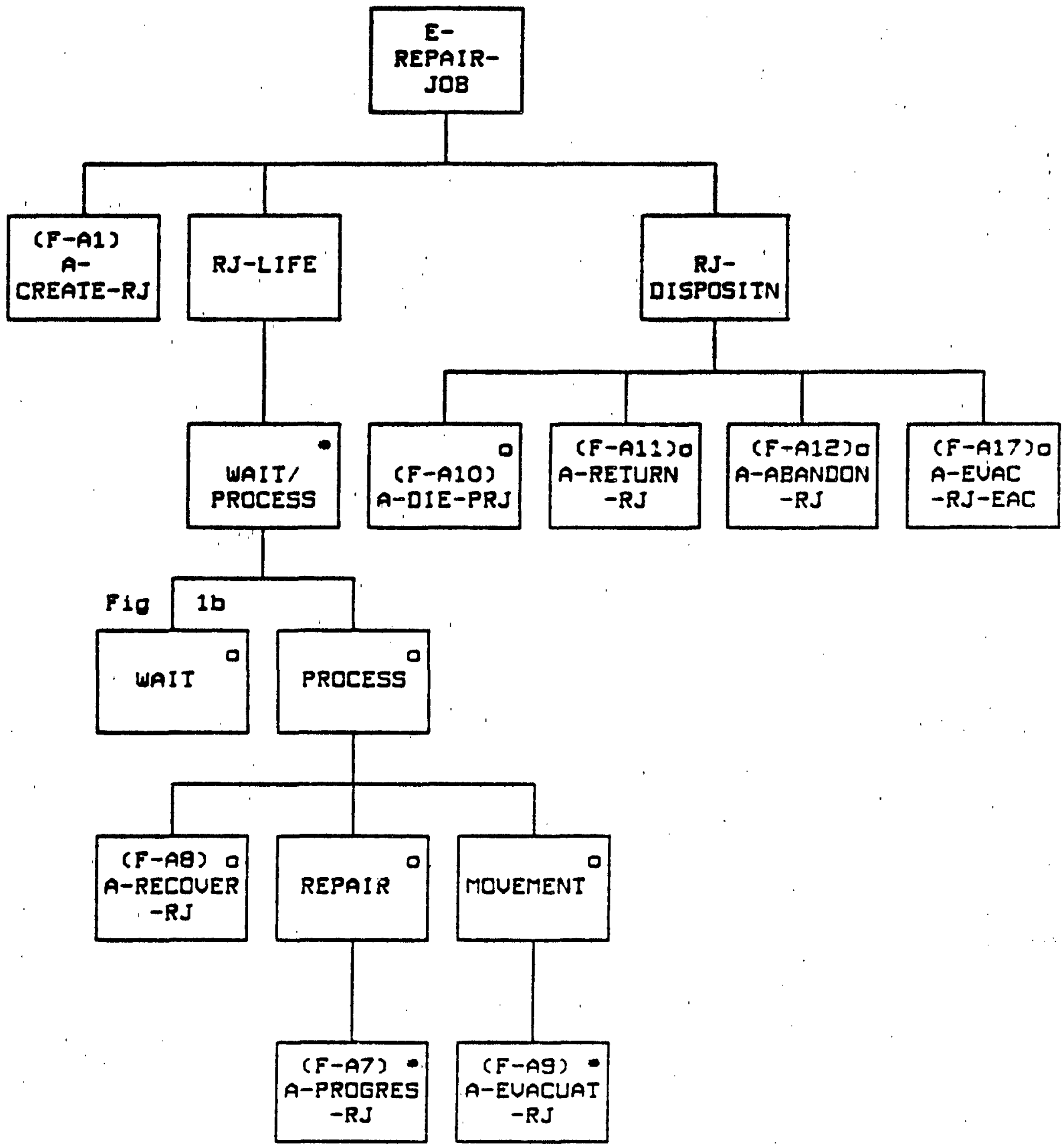

Figure F-1a. Entity-action diagram for E-REPAIR-JOB

F-E1

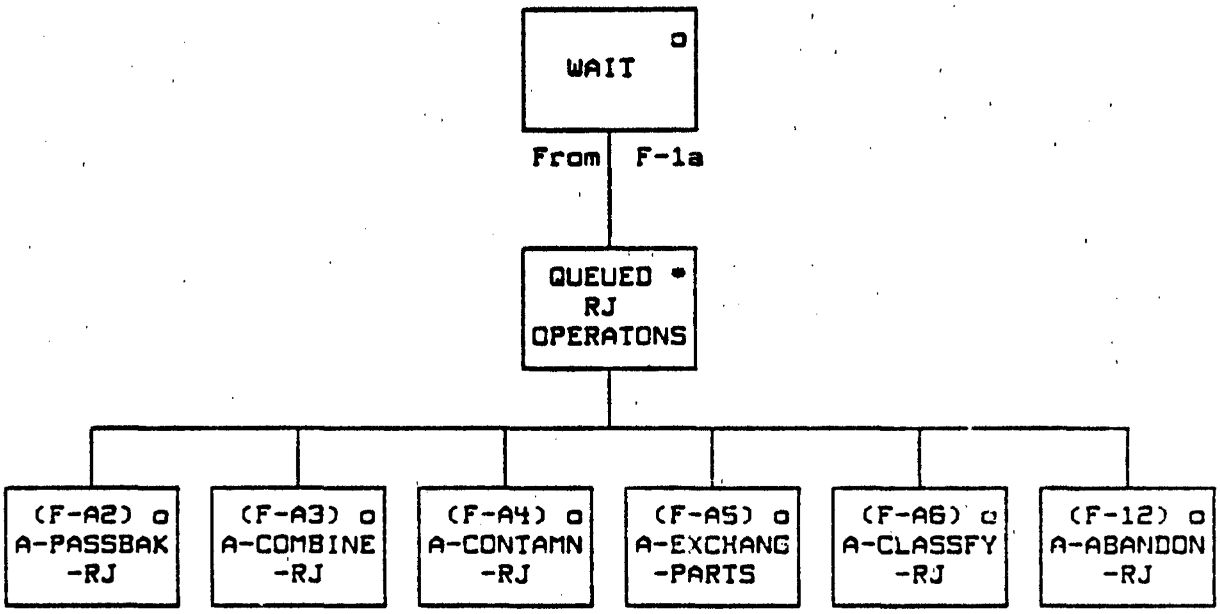

Figure F-1b. Entity-action diagram for E-REPAIR-JOB (continued)

ENTITY ACTION DESCRIPTION: REPAIR-JOB (F-E1)

1. A-CREATE-RJ (F-A1). Initialize state vector as follows:

   - o RJ-ID = next available unique ID
   - o RJ-Qty = RJ-Qty [event given]
   - o Repair-Progress-Flag = Off
   - o Current-RA-Type = RJ-Template
   - o Ex-Parts-Avail (PT) = RJ-Qty * Ex-Parts-Avail (PT) [RJ-Template]
   - o RJ-Creation-Time = [event given]
   - o Evac-Flag = Off
   - o Move-Action-Flag = Off
   - o Contaminated-Flag = [event given]
   - o Mobility-Flag = [RJ-Template given]
   - o Personnel-RJ-Flag = [RJ-Template given]
   - o **RAs (for each RA involved):
     - o RA-Type = [RJ-Template given]
     - o RA-Time-Remaining = [RJ-Template given]
     - o Critical/Fatal-RA-Start-Time = RJ-Creation-Time +
     - o time given in RJ-Template:
       - o **RH-Req (RT) = RH-Qty * RH-Req (RT)
       - o **Parts-Req (PT) = RH-Qty * Parts-Req (PT)

   If RJ is Personnel-Type [RJ-Template given] then

   - o Current-Repair-Site = Repair-Site-ID
   - o Unrecovered-Flag = Off
   - o System-Type = Personnel-Type [event given]

   otherwise,

   - o System-Type = [RJ-Template given]
   - o Current-Repair-Site = Unit-ID [event given]
   - o Unrecovered-Flag = On.

2. A-PASSBACK-RJ (F-A2).

   - o RJ-QTY = RJ-QTY - PASSBACK-QTY [EVENT GIVEN]
     - o **EX-PARTS-AVAIL = RJ-QTY * EA-PARTS-AVAIL (PT) [RJ-TEMPLATE]
   - o **RA
     - o **RH-REQ (RT) = RJ-QTY * RH-REQ (RT) [RJ-TEMPLATE]
     - o **PARTS-REQ (RT) = RJ-QTY * PARTS-REQ (PT) [RJ-TEMPLATE]

REPAIR-JOB (F-E1) (cont.)

3. A-COMBINE-RJ (F-A3).

- o RJ-QTY = RJ-QTY + ADDITIONAL-QTY
  - o **EX-PARTS-AVAIL (PT) = EA-PARTS-AVAIL (PT) + ADDITIONAL-QTY * [Ex-Parts-Avail given in RJ-Template]
- o **RAs
  - o **RH-REQ (RT) = RJ-QTY * RH-REQ (RT) given in RJ-Template
  - o **PARTS-REQ (PT) = PARTS-REQ (PT) + ADDITIONAL-QTY * [PARTS-REQ (PT) given in RJ-Template].

Note 1: Values of Parts-Req (PT) and Ex-Parts-Avail (PT) were not recomputed based upon the new RJ-Qty but were increased based upon the Additional-Qty. Thus, A-EXCHANGE-PARTS may have previously altered the values.

Note 2: A possible modification in the future might be to recompute the RJ-Creation-Time and the RA-Time-Remaining values as weighted averages of the jobs being combined (weights based on RJ-Qtys).

4. A-CONTAMIN-RJ (F-A4). If contaminated flag is already on, then do nothing. Otherwise, turn the contamination flag on and, for all RA,

- o **RH-REQ = RJ-QTY * RH-REQ-CON (RT) [RJ-Template].

5. A-EXCHANGE-PARTS (F-A5). For all PT involved,

- o **EX-PARTS-AVAIL (PT) = EX-PARTS-AVAIL (PT) - EX-PARTS-QTY (PT).

For the current RA,

- o **PARTS-REQ (PT) = PARTS-REQ (PT) + EX-PARTS-QTY (PT)

6. A-CLASSIFY-RJ (F-A6). If Evac-Destination is given in the event, turn the Evac-Flag on and set the Evac-Destination to the given location. Otherwise, set Evac-Flag to "off."

7. A-PROGRESS-RJ (F-A7). Turn the Repair-Progress-Flag on. For the Current-RA,

- o RA-TIME-REMAINING = RA-TIME-REMAINING - TIME-ALLOC
- o **RH-REQ (RT) = RH-REQ (RT) - RH-ALLOC (RT).

If, for all RT,

- o RH-REQ (RT) .LE. 0 AND RA-TIME-REMAINING .LE. 0.

REPAIR-JOB (F-E1) (cont.)

7. F-A7 continued. then, RA is complete. Turn the Repair-Progress-Flag off. If another RA follows, then set the Current-RA to the next RA. Otherwise, RJ is repaired. End this action and perform A-REPAIRED.

8. A-RECOVER-RJ (F-A8). Turn Unrecovered-Flag off. (Note to implementor: Include logic from F-F3 3.1 that will use A-COMBINE-RJ as much as possible to reduce the number of like RJ entities with small fractional quantities.)

9. A-EVACUATE-RJ (F-A9). If departure, then set the Move-Action-Flag on and the Evac-Flag off. If the Unit-Accountability-Flag is on and Evac-Destination is not at the Unit-Accountability-Level (F-CC16), then set the Unit-Accountability-Flag off and invoke immediate F-LOSSES-ALLOC giving the Current-Repair-Site, RJ-Qty, and the Personnel/Systems-Type as attributes. Set the Convoy-ID to the input value. If not departure, then arrival. Set Move-Action-Flag off and the Current-Repair-Site to Evac-Destination.

10. A-DIE-PRJ (F-A10). Send a message to graves registration giving the Current-Repair-Site and the RJ-Qty. If Unit-Accountability-Flag is on, then invoke F-LOSSES-ALLOC. Otherwise, do nothing; the RJ-Entity-Life is over.

11. A-RETURN-RJ (F-A11). If the Unit-Accountability-Flag is on, trigger F-RTNS-ALLOC using Current-Repair-Site, System-Type, and RJ-Qty. If the Personnel-RJ-Flag is on, send a message to personnel using Current-Repair-Site, System-Type, and RJ-Qty. Otherwise, send a message to supply using Current-Repair-Site, System-Type, and RJ-Qty; the RJ-Entity-Life is over.

12. A-ABANDON-RJ (F-A12).

- o RJ-QTY = RJ-QTY - ABANDONED-QTY.

If RJ-QTY = 0, then the RJ-Entity-Life is over. Otherwise,

- o **EX-PARTS-AVAIL (PT) = RH-QTY * EX-PARTS-AVAIL [RJ-Template]
- o **RA
- o **RH-REQ(RT) = RH-QTY * RH-REQ(RT) [RJ-Template]
- o **PARTS-REQ(PT) = PH-QTY * PARTS-REQ(PT) [RJ-Template].

13. A-EVAC-RJ-EAC (F-A17). End the RJ-Entity-Life.

** indicates zero or more instances of the variable.

F-E2

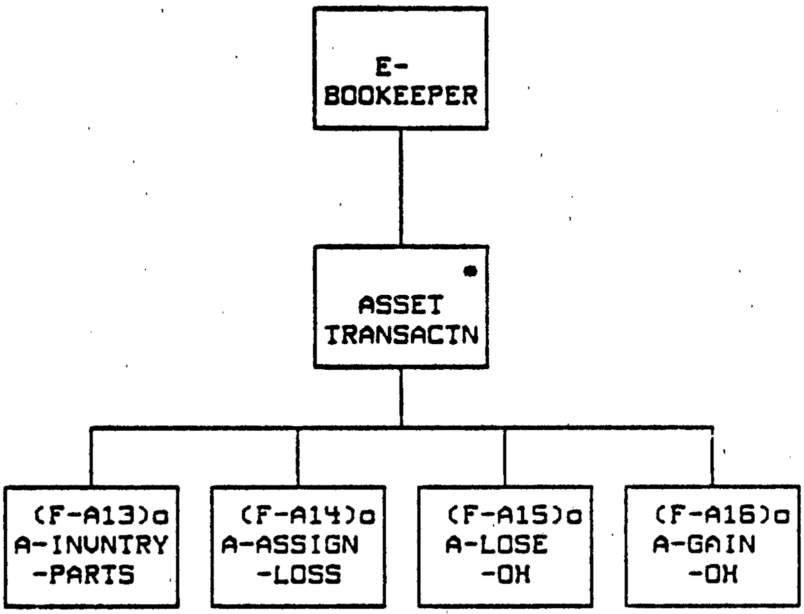

Figure F-2. Entity-action diagram for E-BOOKEEPER

ENTITY-ACTION DESCRIPTION: BOOKKEEPER (F-E2)

1. A-INVENTORY-PARTS (F-A13).

   o **Parts-Bal (PT) equal to event-given amounts.

2. A-ASSIGN-LOSS (F-A14).

   ASSIGNED-QTY (SYSTEM/PERSONNEL-TYPE) = ASSIGNED-QTY
   (SYSTEM/PERSONNEL-TYPE) - LOSS-QTY (SYSTEM/PERSONNEL-TYPE).

3. A-LOSE-OH (F-A15).

   OH-QTY (SYSTEM/PERSONNEL-TYPE) = OH-QTY
   (SYSTEM/PERSONNEL-TYPE) - LOSS-QTY (SYSTEM/PERSONNEL-TYPE).

4. A-GAIN-OH (F-A16).

   OH-QTY (SYSTEM/PERSONNEL-TYPE) = OH-QTY
   (SYSTEM/PERSONNEL-TYPE) + GAIN-QTY (SYSTEM/PERSONNEL-TYPE).

** indicates zero or more instances of the variable.

4. GENERATOR FUNCTION LIST.

F-F1 F-REP-RES-ALLOC

SUMMARY: This function computes the available resource-hour capability of a unit for the given time period, then allocates the capability to the demanding REPAIR-JOBs, updating their states accordingly.

TRIGGERED BY: Repair dispatcher

RESULTING IN:		
	REPAIR-JOB	(F-E1)
	A-PROGRESS-RJ	(F-A7)
	A-DIE-PRJ	(F-A10)
	A-EXCHANGE-PARTS	(F-A5)
	BOOKKEEPER	(F-E2)
	A-INVENTORY-PARTS	(F-A13)

F-F2 F-H/M-ASSESS

SUMMARY: This function computes the current requirement for movement of RJs from their existing location.

TRIGGERED BY: Repair dispatcher

RESULTING IN:		
	REPAIR-JOB	(F-E1)
	A-CLASSIFY-RJ	(F-A6)

F-F3 F-TRANSFORM

SUMMARY: This function transforms information on combat damage hits in RJs based upon expected value tables.

TRIGGERED BY: Repair dispatcher

RESULTING IN:		
	REPAIR-JOB	(F-E1)
	A-COMBINE-RJ	(F-A3)
	A-CREATE-RJ	(F-A1)
	BOOKKEEPER	(F-E2)
	A-ASSIGN-LOSS	(F-A14)

F-F4 F-RAM/DNBI-INIT

SUMMARY: This function computes unit RAM/DNBI losses by resulting RJ types.

TRIGGERED BY: Repair dispatcher

RESULTING IN:	REPAIR-JOB	(F-E1)
	A-COMBINE-RJ	(F-A3)
	A-CREATE-RJ	(F-A1)
	BOOKKEEPER	(F-E2)
	A-LOSE-OH	(F-A15)
	A-ASSIGN-LOSS	(F-A14)

F-F5 F-BATTLE-EFFECT

SUMMARY: This function generates unrecovered RJ losses to withdrawing units in combat.

TRIGGERED BY: Repair dispatcher

RESULTING IN:	REPAIR-JOB	(F-E1)
	A-COMBINE-RJ	(F-A3)
	A-CREATE-RJ	(F-A1)
	A-PASSBACK-RJ	(F-A2)
	BOOKKEEPER	(F-E2)
	A-ABANDON-RJ	(F-A12)
	A-ASSIGN-LOSS	(F-A14)

F-F6 F-RECOVERY

SUMMARY: This function computes the available recovery capability of a unit for a given time period, then allocates the capability to demanding RJs updating their states accordingly.

TRIGGERED BY: Repair dispatcher

RESULTING IN:	REPAIR-JOB	(F-E1)
	A-RECOVER-RJ	(F-A8)

F-F7 F-RECOVERY-SUPPORT

SUMMARY: This function allocates any unit capability remaining after a unit has performed its own support recovery mission for any defined direct-support recovery and cross-leveling recovery support relationships. By playing support units in a table-listed order (S2) and allowing a unit to be supported by 0 or more supporting units, any RV allocation and support unit concept can be played. Examples include:

- o unit recovery only; no support provided (complete decentralization)
- o no unit support; recovery from a support unit (complete centralization)
- o Brigade-wide support only
- o Division-wide support only
- o Brigade and division support
- o Different support structures in different parts of the corps over time

TRIGGERED BY: Repair dispatcher

RESULTING IN: REPAIR-JOB (F-E1)
A-RECOVER-RJ (F-A8)

F-F8 F-RECOVERY-SHORT

SUMMARY: This function represents operational systems performing recovery missions when there is a shortfall in the usual recovery capability. It is controlled by a table that shows the threshold for recovery performance of operational systems for each unit. The threshold is the percentage of the authorized quantity of each system. If a unit has some quantity of a system on hand (OH) over this threshold amount, that quantity is authorized to perform recovery. If and when this quantity is used for recovery, no check is made against its use in its primary mission (i.e., if an operational tank is used to recover another tank, no check exists to ensure it was not or would not be involved in combat). For this reason, the threshold values should be cautiously selected and the extent to which a unit is used for recovery closely monitored for double utilization problems.

TRIGGERED BY: Repair dispatcher

RESULTING IN: REPAIR-JOB (F-E1)
A-RECOVER-RJ (F-A8)

F-F9 F-CONTAMIN-EFFECT

SUMMARY: When unit receives a contaminating attack, all RJs in the unit are contaminated. This function invokes A-CONTAMIN-RJ (F-A4) on the RJs in the unit.

TRIGGERED BY: Repair dispatcher

RESULTING IN:	REPAIR-JOB	(F-E1)
	A-CONTAMIN-RJ	(F-A4)

F-F10 F-RTNS-ALLOC

SUMMARY: This function allocates repaired systems or personnel to owning units. Two methods are available for allocation and are employed based upon a flag.

TRIGGERED BY: Repair dispatcher

RESULTING IN:	BOOKKEEPER	(F-E2)
	A-GAIN-OH	(F-A16)

F-F11 F-EVAC-MANAGER

SUMMARY This function determines which RJs should be moved when a transportation asset becomes available for evacuation.

TRIGGERED BY: Transportation module

RESULTING IN:	REPAIR-JOB	(F-E1)
	A-EVACUATE-RJ	(F-A9)
	BOOKKEEPER	(F-E2)
	A-EVAC-RJ-EAC	(F-A17)

F-F12 F-EVAC-RECEIVER

SUMMARY: This function is used to recognize the arrival of evac materiel and to trigger RJ state changes showing RJ at the new repair site.

TRIGGERED BY: Transportation module

RESULTING IN:	REPAIR-JOB	(F-E1)
	A-EVACUATE-RJ	(F-A9)

F-F13 F-LOSSES-ALLOC

SUMMARY: This function allocates assigned strength losses of personnel and systems (normally treated/repaired and directly returned to their unit) who have been or will be evacuated to a higher repair echelon from which returns are allocated through personnel and supply channels. If a patient normally treated and directly returned dies, the assigned strength loss must also be allocated.

TRIGGERED BY:	REPAIR-JOB	(F-E1)
	A-EVACUATE-RJ	(F-A9)
	A-DIE-PRJ	(F-A10)
RESULTING IN:	BOOKKEEPER	(F-E2)
	A-ASSIGN-LOSS	(F-A14)

APPENDIX F

Annex

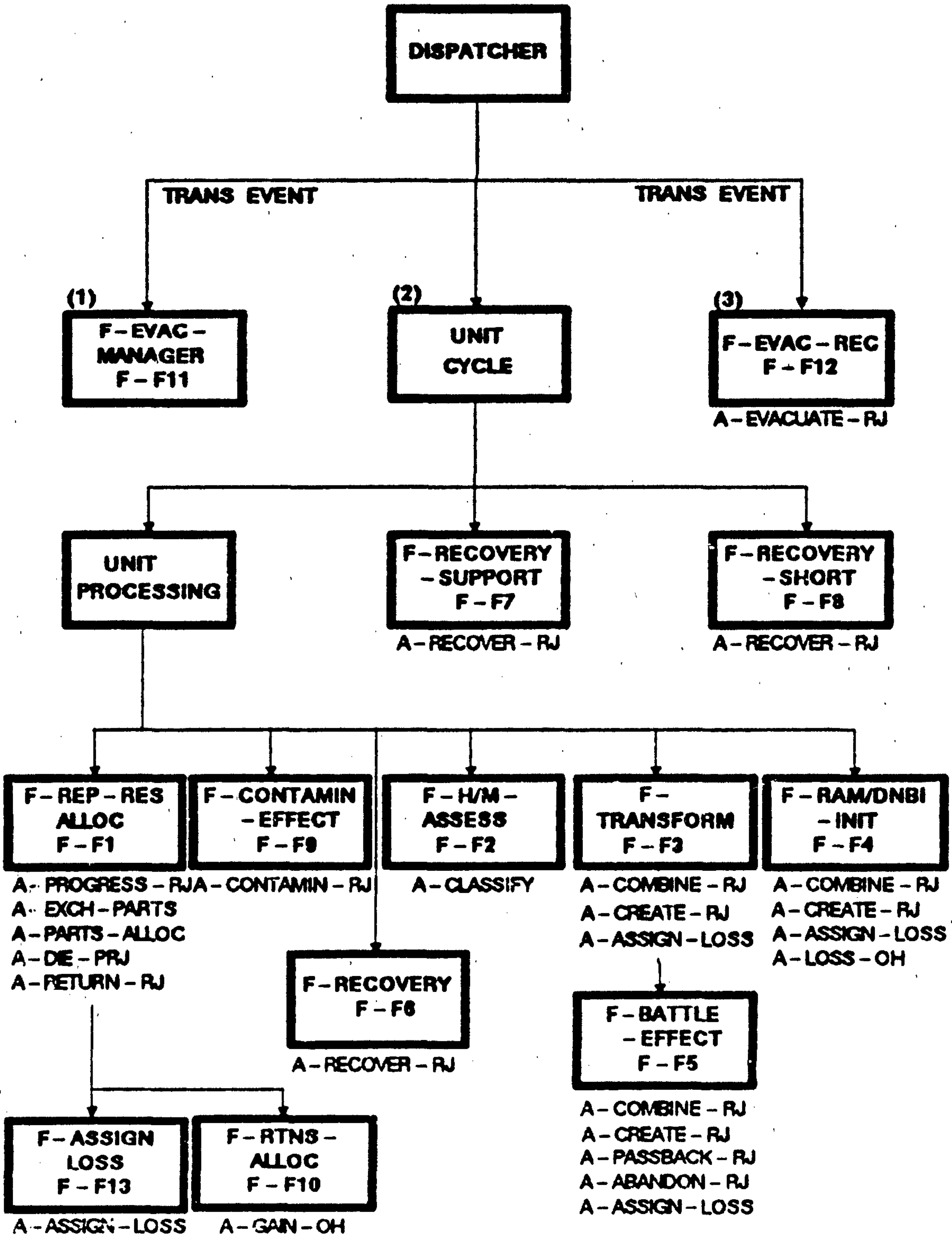

Figure F-3. Medical and maintenance dispatcher

F-F1 F-REP-RES-ALLOC TYPE: Interactive Function

SUMMARY: This is part of a sequence of functions performed for each model-portrayed unit during every repair module timestep. It computes the available resource hour capability of a unit for the given time period, then allocates the capability to the demanding REPAIR-JOBs, updating their states accordingly.

TRIGGERED BY: Repair dispatcher

RESULTING IN:

REPAIR-JOB	(F-E1)
A-PROGRESS-RJ	(F-A7)
A-DIE-PRJ	(F-A10)
A-EXCHANGE-PARTS	(F-A5)
BOOKKEEPER	(F-E2)
A-INVENTORY-PARTS	(F-A13)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-4.

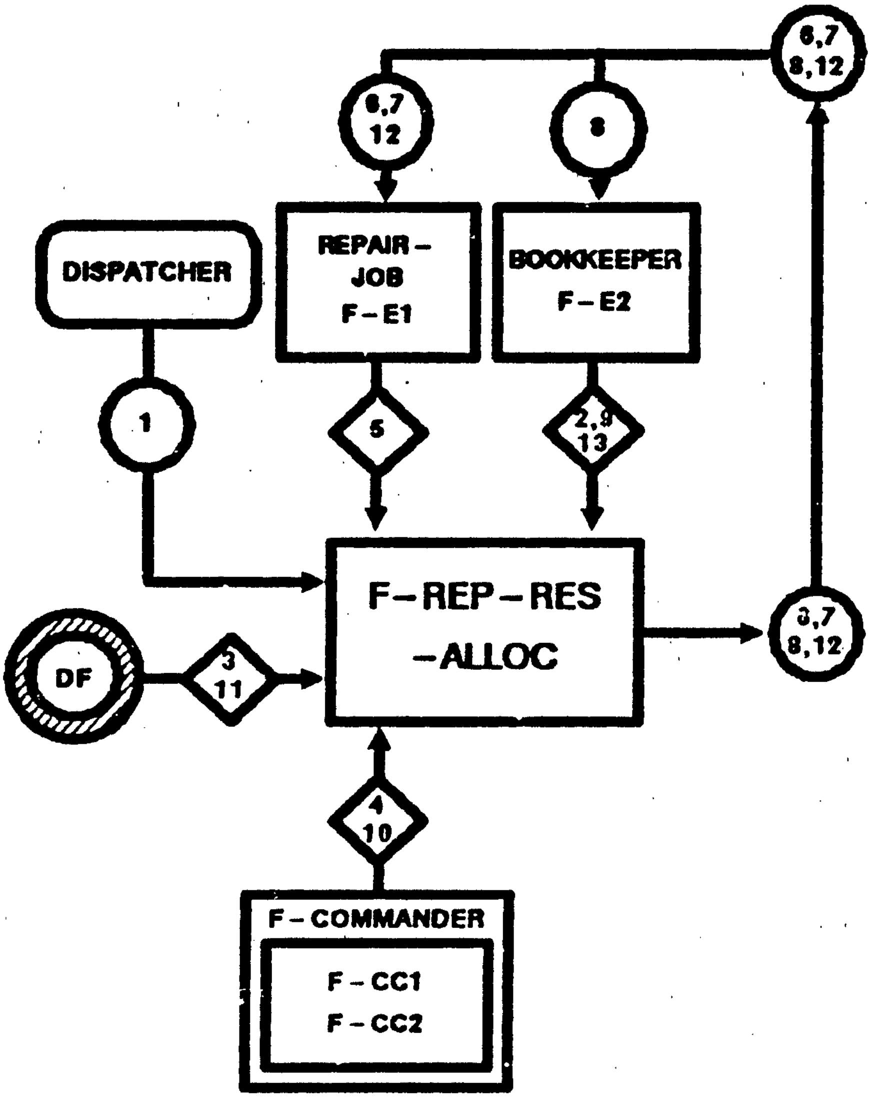

Figure F-4. F-REP-RES-ALLOC SSD

DATA DEFINITION: F-REP-RES-ALLOC

Connection Number	Data Transferred	Comments
D1	o Unit-ID o Time-Inc o Beg-Time-Inc	Amount represented by this timestep
S2	o OH-Str o Unit-ID 'key' o RT 'key'	On-hand strength by resource type (RT); RT within the repair module can be any unit asset (personnel or equipment).
S3	o Daily-Avail-RH o Unit-ID 'key' o RT 'key'	Daily available resource hours (RH) by RT. Gives the number of hours in a 24-hr period a resource would be available for work. (F-DF1)
S4	o Unit-RA-Priority-Table o Unit ID 'key'	Used in allocating available RH and parts to RJs in a prioritized order. (F-CC1)
S5	o RJ state vector o RJ-ID 'key'	
D6	o RH-Alloc o Time-Alloc o RJ-ID 'key'	Action attribute of A-PROGRESS RJ (F-A7).
D7	o RJ ID	A-DIE-PRJ attribute
D8	o Parts-Avail o Unit-ID 'key'	A-PARTS-ALL attribute

DATA DEFINITION: F-REP-RES-ALLOC (cont.)

Connection Number	Data Transferred	Comments
S9a	o Degradation factors o Unit movement degradation factor o MOPP degradation factor o Radiation degradation factor o Suppression factors	Factors (unit states) the model must record every maint cycle. (Direct, air, artillery)
S9b	o Unit-ID 'key' o time 'key'	
S10	o Ex-In-Pri-Policy o Ex-Out-Pri-Policy o Unit-ID 'key'	F-CC2
S11	o RT-Substitutes o RT-Req 'key'	F-DF2
D12	o Ex-PARTS-ALL o RJ-ID 'key'	A-EXCHANGE-PARTS (F-A5) attributes
S13	o Parts-Bal o Unit-ID 'key'	

F-F1

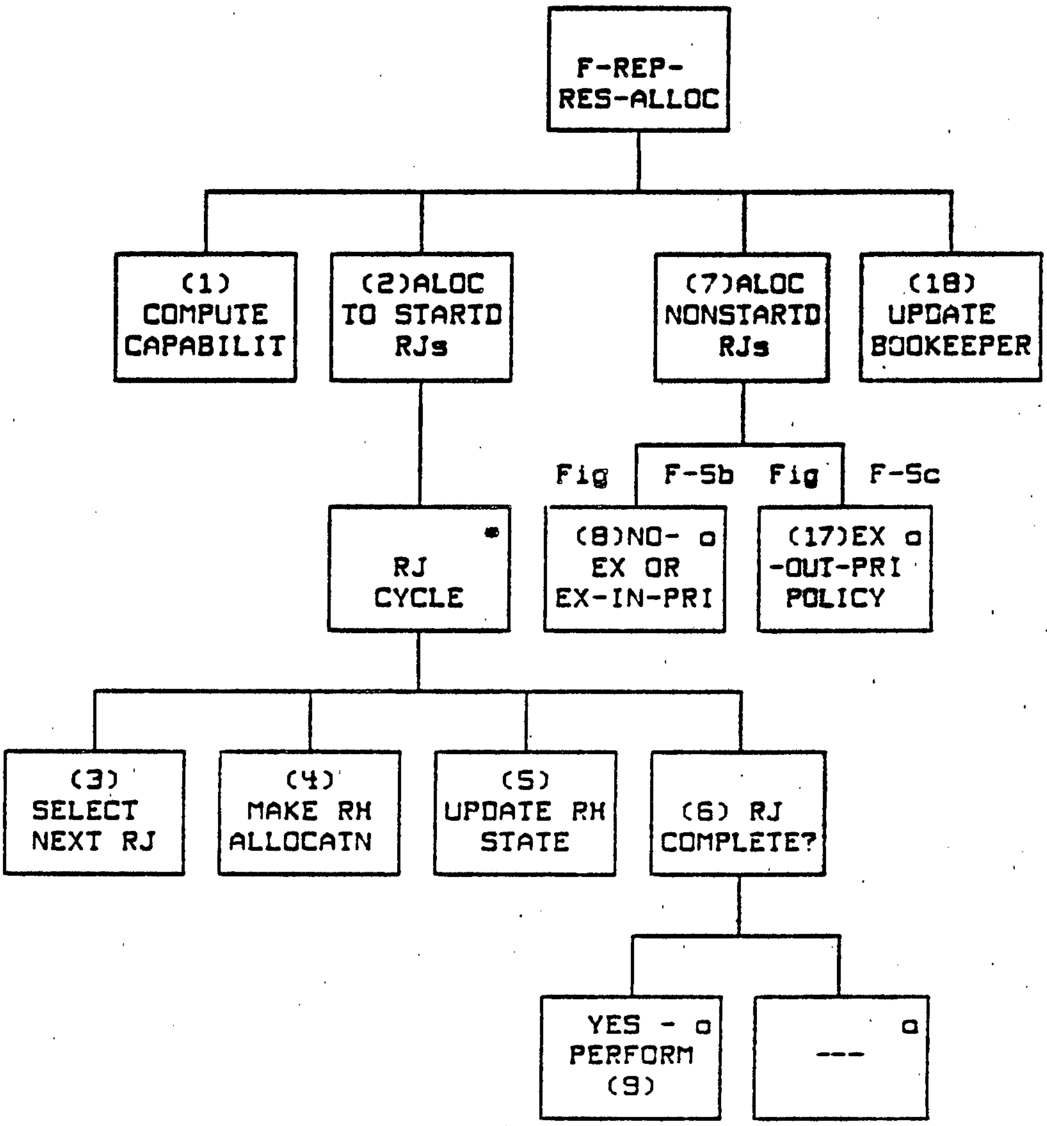

Figure F-5a. F-REP-RES-ALLOC generator

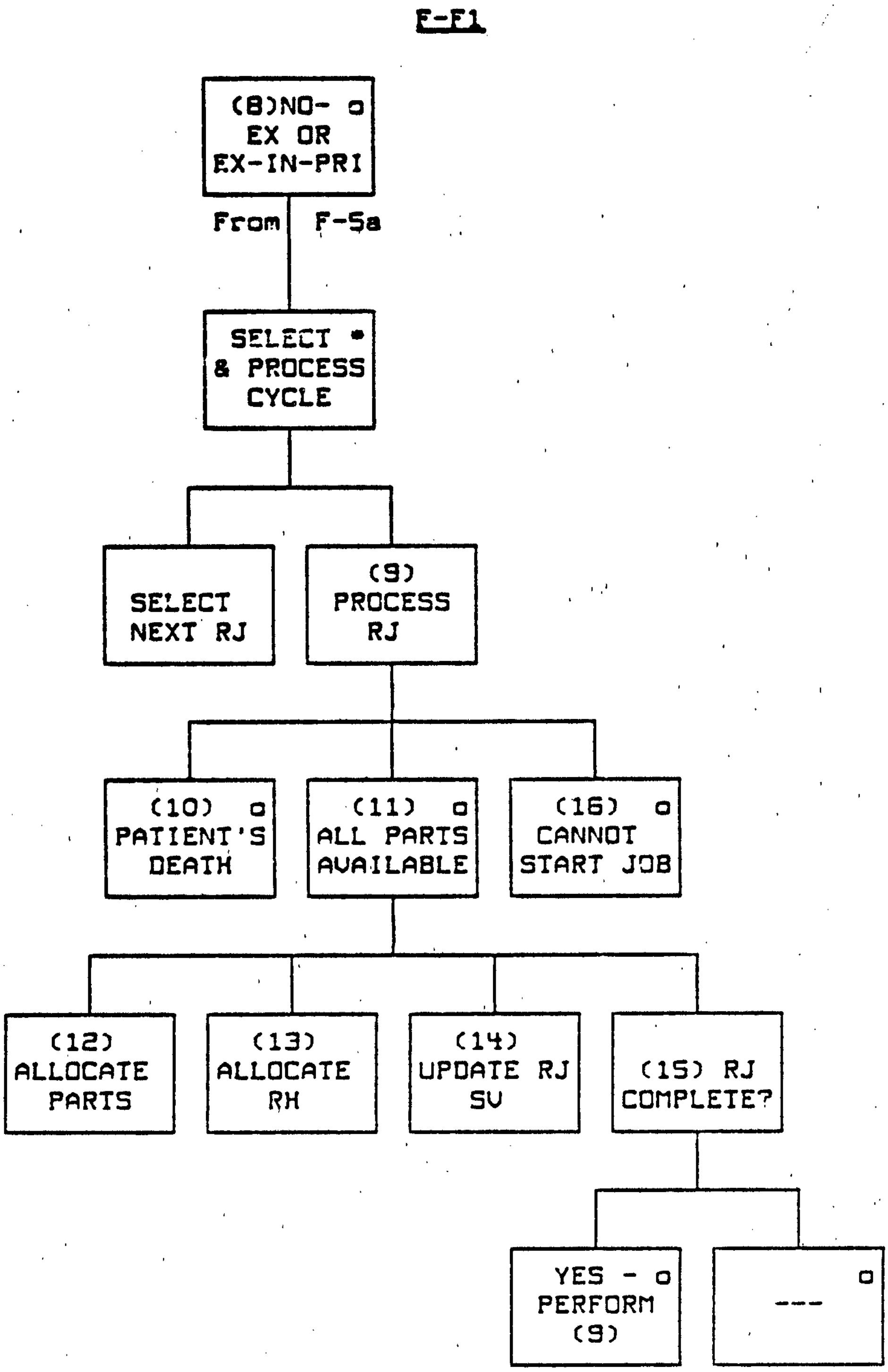

Figure F-5b. F-REP-RES-ALLOC generator (continued)

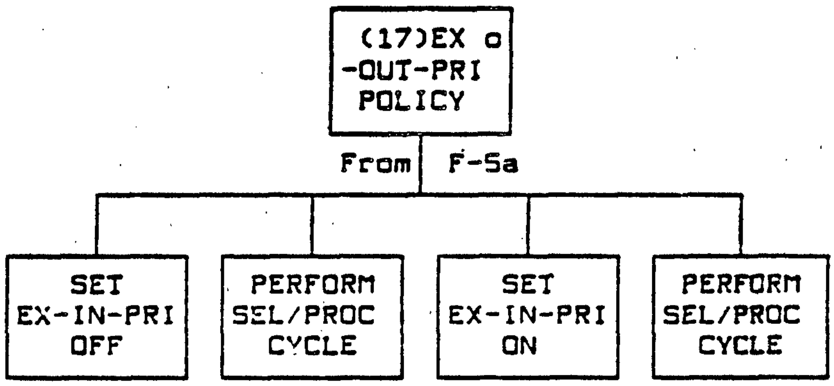

Figure F-5c. F-REP-RES-ALLOC generator (continued)

F-REP-RES-ALLOC (cont.)

6. RJ COMPLETE? If the current RJ has a new RA (i.e., examine the state vector of the RJ just processed (S5) and determine if the old RA was just completed) and the new RA is repairable at the unit (i.e., the RA is listed in the Unit-RA-Priority-Table (S4)), then perform the RJ process described in step 9 and return.

7. ALLOCATE TO NOT-STARTED RJS. If no parts exchange is permitted (S10) (i.e., Ex-In-Pri-Policy.eq.false and Ex-Out-Pri-Policy.eq.false) or if a parts exchange in priority sequence processing is permitted (S10) (i.e., Ex-In-Pri-Policy.eq.true), then perform the No-Ex or Ex-In-Pri cycle.

8. NO-EX OR EX-IN-PRI. Cycle through the RJs to select and process those not begun. If any RJs not started have not been selected, then select the next RJ not yet started. RJs should be selected based upon a first-level sort by Unit-RA-Priority (S4) and a second-level sort by ascending RA-Time-Remaining (S5). Priority is specified with RA-ID and the contamination flag. An RJ not yet started is an RJ with Repair-Progress-State flag off. The RJ evac flag must be ignored or no RJs will remain for selection. If no RJ can be selected then stop the cycle.

9. PROCESS RJ. The RJ process is a selection between steps 10, 11 through 15, and 16 based on the conditions described.

10. PATIENT'S DEATH. If the current-RA (S5) has Critical Fatal-RA-Start-Time(S5).LT.Beg-Time-Inc (D1), then the patient has died, so invoke A-DIE-PRJ (D7) and stop the RJ process.

11. ALL PARTS AVAILABLE. If Ex-In-Pri-Policy.eq.true, the parts requirements should be satisfied from the regular Parts-Avail(PT) inventory first and then, if needed, from the Ex-Parts-Avail(PT) of other RJs; otherwise, it must be satisfied only from the Parts-Avail(PT) inventory. When selecting one or more RJs for Ex-Parts-Avail, do not select from RJs already started. Search RJs in reverse priority order from the Unit-RA-Priority Table (S4). If RA Parts-Req(PT) (S5) can be satisfied in full and RH-Avail(RT).GT.0 for all required or substitutable RT, then Allocate parts and RH available.

12. ALLOCATE PARTS. Allocate to PARTS-ALL(PT) the Parts-Req(PT) amount from the Parts-Avail(PT) inventory and/or the Ex-Parts-Avail(PT) from other RJs. If Ex-In-Pri-Policy.eq.true, the parts requirements should first be satisfied from the regular Parts-Avail(PT) inventory and then, if needed, from the Ex-Parts-Avail(PT) of other RJs; otherwise, it must be satisfied only from the Parts-Avail(PT) inventory. Reduce the Parts-Avail(RT) and Ex-Parts-Avail(RT) inventories accordingly.

F-F1

GENERATOR DESCRIPTION: F-REP-RES-ALLOC

1. COMPUTE CAPABILITY. Compute the resource hours (RH) for each resource type (RT) available in the unit (D1) using the following algorithm:

```
RH-AVAIL(RT) = ((OH-STR(UNIT-ID,RT) * DAILY-AVAIL-RH(UNIT-
                  ID,RT)) /(24/TIME-INC))
               * (1 - RADIATION DEGREDATION FACTOR)
               * (1 - MOPP DEGRADATION FACTOR)
               * (1 - DIRECT FIRE SUPPRESSION DEGRADATION FACTOR)
               * (1 - AIR SUPPRESSION DEGRADATION FACTOR)
               * (1 - ARTILLERY SUPPRESSION DEGRADATION FACTOR)
               * (1 - UNIT MOVE DEGRADATION FACTOR)

where:   RH-Avail(RT)  is local data
           OH-Str  from  S2
           Daily-Avail-RH  from S3
           Time-Inc  from D1
           last six factors are recorded from CORDIVEM for the
           unit every maint cycle timestep
```

Initialize Parts-Avail(PT) from values in BOOKKEEPER (S13).

2. ALLOCATE TO STARTED RJs. Cycle through the RJs selecting and allocating capability to those already started (steps 3 through 6). If no RJ can be selected or no resource hours remain (all RH-Avail = 0), then stop the cycle.

3. SELECT NEXT RJ. If any RJs already started have not been selected, then select the next RJ already started. RJs should be selected based upon a first-level sort by Unit-RA-Priority (S4) and a second-level sort by ascending RA-Time-Remaining (S5). Priority is specified with RA-ID and the contamination flag. RJs already started are those RJs with the Repair-Progress-State flag on. The evac flag in RJ must be ignored during selection or no RJ can be selected.

4. MAKE RH ALLOCATION. Allocate to RH-Alloc(RT) as many RH-Avail(RT) as possible to satisfy the RH-Req(RT) of current RA of the selected RJ(s). If any allocation does not completely satisfy the RH-Req(RT), attempt to satisfy the shortfall with a substitutable RT (defined in S11). Any substitute allocation should be from the RH-Avail(RT) of the substitute RT to the RH-Alloc(RT) of the required RT. Reduce the RH-Avail(RT) amounts by the amounts allocated.

5. UPDATE RJ STATE. Invoke A-PROGRESS-RJ using RH-Alloc(RT) and Time-Inc (from D1) as parameters (D6).

F-REP-RES-ALLOC (cont.)

13. ALLOCATE RH. Allocate to RH-Alloc(RT) as many RH-Avail(RT) as possible to satisfy the RH-Req(RT) of the current RA of the selected RJ. If any allocation does not completely satisfy the RH-Req(RT), attempt to satisfy the shortfall with a substitutable RT (defined in S11). Any substitute allocation should be from the RH-Avail(RT) of the substitute RT to the RH-Alloc(RT) of the required RT. Reduce the RH-Avail(RT) amounts by the amounts allocated.

14. UPDATE RJ SV. Invoke A-PROGRESS-RJ using RH-Alloc(RT) and Time-Inc as parameters (D6). For each RJ from which Ex-Parts-Avail were used, invoke A-EXCHANGE-PARTS using quantity allocated (D12).

15. RJ COMPLETE? If the current RJ has a new RA (i.e., examine the state vector of the RJ just processed (S5) and determine if the old RA was just completed) and the new RA is repairable at the unit (i.e., the RA is listed in the Unit-RA-Priority-Table (S4)), then perform the RJ process described in step 9 and return.

16. CANNOT START JOB. If all of the parts cannot be obtained for a RA or if some of the resources of each resource type are not available, the job cannot be started.

17. EX-OUT-PRI POLICY. If the conditions needed for the No-Ex or Ex-In-Pri cycle (step 7) are not available, then do the following:

- o Set the Ex-In-Pri flag off.
- o Perform the select and process cycle (step 8).
- o Set the Ex-in-Pri on.
- o Perform the select and process cycle. (step 8).

18. UPDATE BOOKKEEPER. Invoke A-INVENTORY-PARTS using Parts-Avail(PT) as parameters (D8).

F-F2 F-HOLD/MOVE-ASSESS TYPE: Interactive Function

SUMMARY: This function computes the current requirement for movement of RJs from their existing locations.

TRIGGERED BY: Repair dispatcher

RESULTING IN: REPAIR-JOB (F-E1)
A-CLASSIFY-RJ (F-A6)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-6.

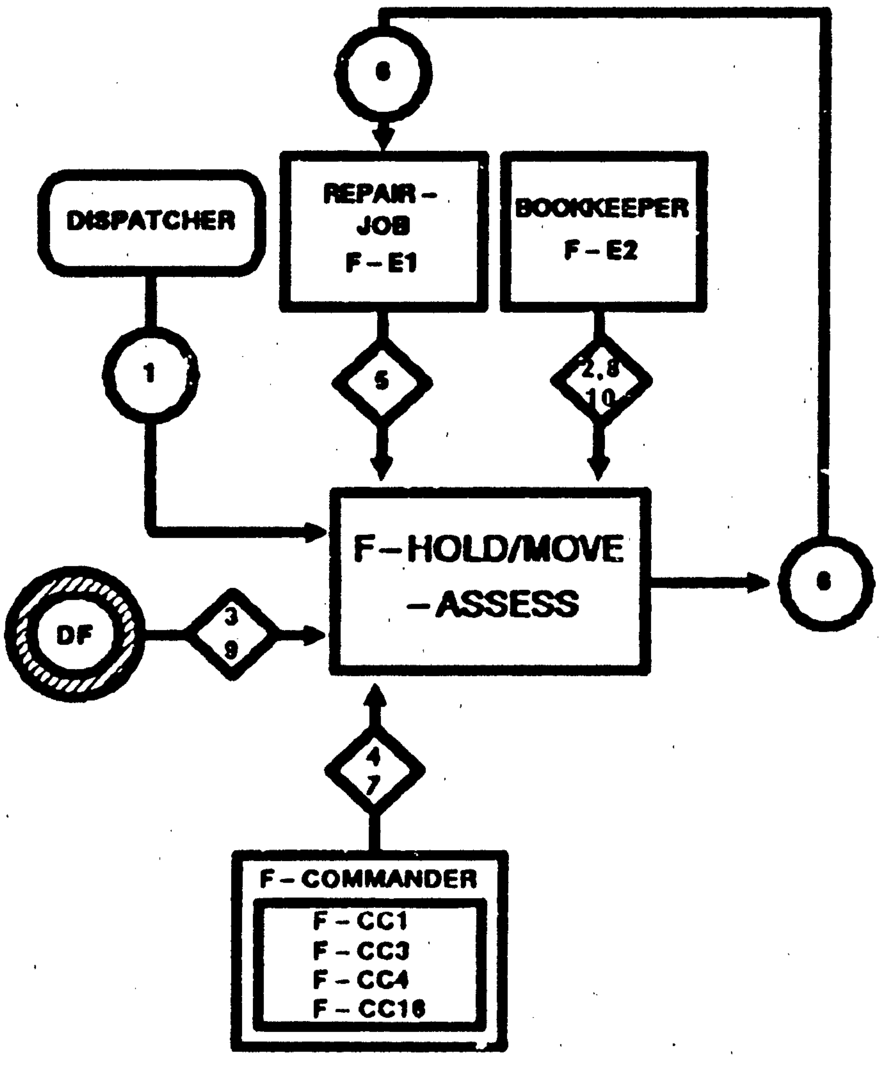

Figure F-6. F - HOLD/MOVE - ASSESS SSD

DATA DEFINITION: F-HOLD/MOVE-ASSESS

Connection Number	Data Transferred	Comments
D1	o Unit-ID	Function trigger.
S2	o OH-Str o Unit-ID 'key' o RT 'key'	On Hand Strength by resource type (RT); RT within the repair module can be any unit asset--personnel or equipment.
S3	o Hold-Evac-Time-Factor o Daily-Avail-RH o Unit-ID 'key' o RT 'key'	Daily available resource hours (RH) by RT. Gives the number of hours in a 24-hr period a resource would be available for work (F-DF1).
S4	o Unit-RA-Priority-Table o Unit ID 'key'	This table is used in allocating available RH and parts to RJs in a priority order (F-CC1).
S5	o RJ state vector o RJ-ID 'key'	
D6	o Support-Location-ID	Action attribute for A-CLASSIFY-RJ (F-A6).
S7a	o Hold-Evac-Time-Factor o UNIT-ID 'key'	F-CC3
S7b	o Accountable-flag o Unit-ID 'key'	Repair-Job-Owning-Unit-Accountability-Table (F-CC16).
S7c	o Support-Unit-ID o Unit-ID key o RJ-Type key	F-CC4

F-F2

DATA DEFINITION: F-HOLD/MOVE-ASSESS (cont.)

Connection Number	Data Transferred	Comments
S8a	o Degradation factors o Unit movement degradation factor o MOPP degradation factor o Radiation degradation factor o Suppression factors	Factors (unit states) the model must record every maint cycle. (Direct, air, artillery)
S8b	o Unit-ID 'key' o time 'key'	
S9	o RT-Substitute* o RT-Req 'key'	F-DF2
S10	o Parts-Bal o Unit-ID 'key'	

F-F2

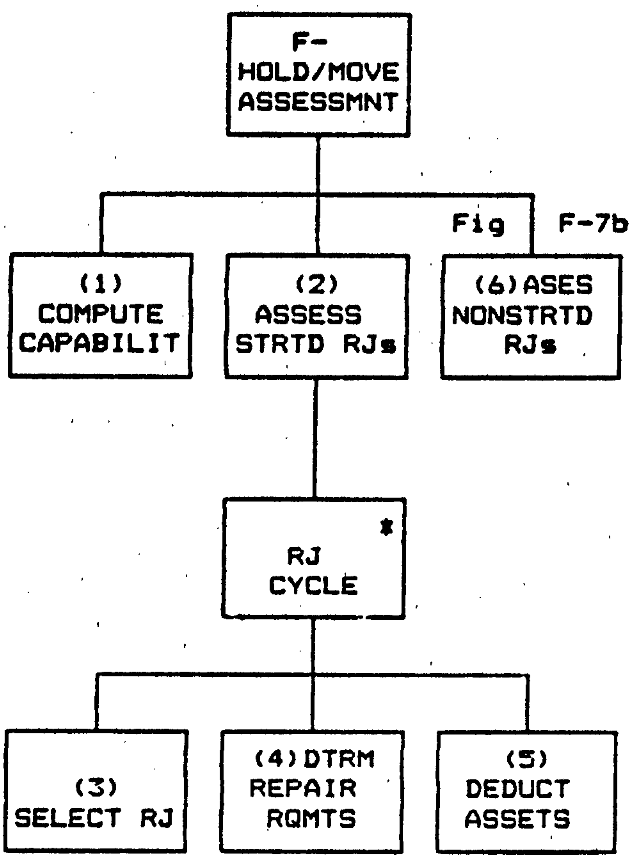

Figure F-7a. F-HOLD/MOVE ASSESSMENT generator

F-F2

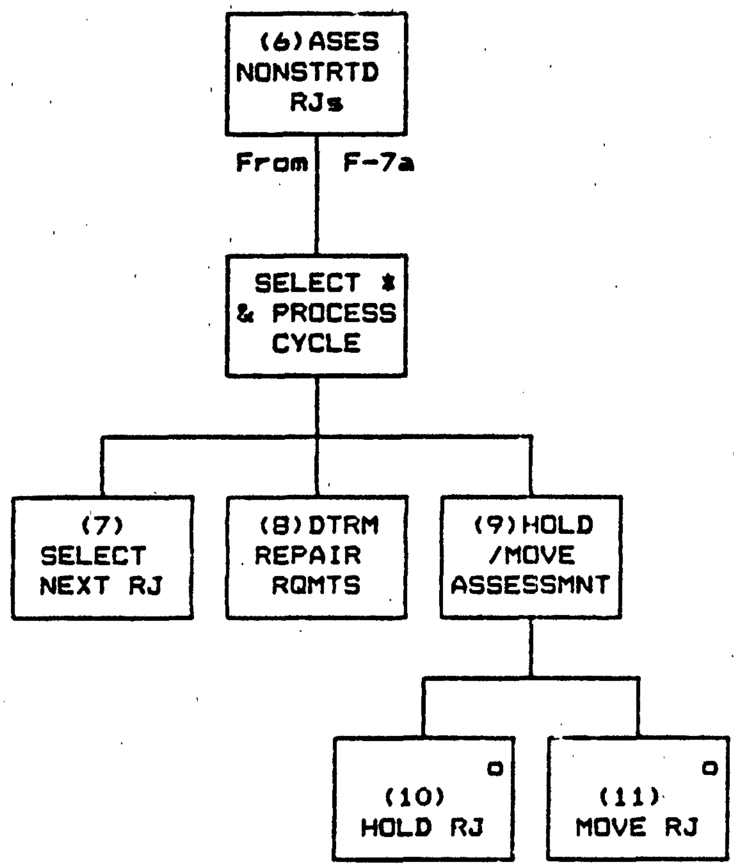

Figure F-7b. F-HOLD/MOVE ASSESSMENT generator (continued)

F-F2

GENERATOR DESCRIPTION: F-HOLD/MOVE-ASSESS

1. COMPUTE CAPABILITY. Compute the estimated resource hours (RH) available to satisfy existing current RJ requirements within the established hold/move thresholds:

```
RH-AVAIL(RT) = ((OH-STR(UNIT-ID,RT) * DAILY-AVAIL-RH(UNIT-ID,RT)) /
               (24/HOLD-EVAC-TIME-FACTOR))
               * (1 - RADIATION DEGREDATION FACTOR)
               * (1 - MOPP DEGRADATION FACTOR)
               * (1 - DIRECT FIRE SUPPRESSION DEGRADATION FACTOR)
               * (1 - AIR SUPPRESSION DEGRADATION FACTOR)
               * (1 - ARTILLERY SUPPRESSION DEGRADATION FACTOR)
               * (1 - UNIT MOVE DEGRADATION FACTOR)

      where:   RH-Avail(RT) is local data
               OH-Str from S2
               Daily-Avail-RH from S3
               Hold-Evac-Time-Factor from S7a
```

Initialize Parts-Avail(PT) from values in BOOKKEEPER S10.

2. ASSESS STARTED RJs. Cycle through the RJs, selecting those already started to assess the RJ asset requirements.

3. SELECT RJ. If any RJs already started have not been selected, then select next RJ already started; otherwise, select no RJ. RJs should be selected based upon a first-level sort by Unit-RA-Priority (D4) and a second-level sort by ascending RA-Time-Remaining (S5). The priority is specified by the RA-ID and the contamination flag. RJs already started are defined as RJs with the Repair-Progress-State flag on.

4. DETERMINE REPAIR REQUIRMENTS. Determine the total RJ Repair requirements for the RAs to be performed at the current site. Check against the RA-Priority-Table (D4) to determine which RAs are to be performed at the current site. Cumulate Part-Req(PT) and RH-Req(RT) totals to complete all of the current repair site RAs of the RJ.

5. DEDUCT ASSETS. Deduct cumulated Part-Req(PT) and RH-Req(RT) totals from the remaining available parts and resource hours.

6. ASSESS RJs NOT STARTED . Cycle through the RJs to select and process those not yet begun. If no RJ can be selected, then stop the cycle. Note: This cycle should end without having checked all the RJs because the remaining RJs have a current RA not authorized for the repair site and therefore are not listed in the unit RA-Priority-Table. Take the remaining RJs and perform a MOVE RJ (step 11) on each.

F-HOLD/MOVE-ASSESS (cont.)

7. SELECT NEXT RJ. If any RJs not started have not been selected, select the next RJ not yet started. Otherwise, no RJs remain for selection. RJs should be selected based upon a first-level sort by Unit-RA-Priority (D4) and a second-level sort by ascending RA-Time-Remaining (S5). Priority is specified by the RA-ID and the contamination flag. An RJ not yet started is defined as an RJ with the Repair-Progress-State flag off. The RJ evac flag must be ignored or no RJs will remain for selection. If no RJ can be selected, stop the cycle.

8. DETERMINE REPAIR REQUIRMENTS. Determine the total RJ repair requirements for RAs to be performed at the current site. Check against the RA-Priority-Table (D4) to determine which RAs are to be performed at the current site. Cumulate the time requirements, the Part-Req(PT), and the RH-Req(RT) totals to complete all of the current repair site RAs of the RJ.

9. HOLD/MOVE ASSESSMENT. If the current RA is repairable at this site (i.e., check against Unit-RA-Priority-Table (D4)) and if total Parts-Req(PT) can be satisfied in full from Parts-Avail(PT) and the total RH-Req(RT) can be satisfied in full (i.e., if any requirement cannot be completely satisfied with the required RT) then a substitutable RT (defined in S9) should be used to satisfy the shortfall. Note that any substitute allocation should be made from the RH-Avail(RT) of the substitute RT.), and if TIME-REQ TOTAL .LE. HOLD-TIME-EVAC-FACTOR, then the RJ RAs for this site can theoretically be repaired within the hold/move guidelines given in HOLD RJ (step 10) and MOVE RJ (step 11).

10. HOLD RJ. Deduct the total parts and RH allocated to the complete RJ from the totals available.

11 MOVE RJ. Determine the support location to which the RJ should be moved to form the Support-Location-Table (Unit-ID,RJ-Type) (S7c). Invoke A-CLASSIFY-RJ (D6) using the support location identified above as the parameter.

F-F3 F-TRANSFORM TYPE: Interactive Function

SUMMARY: This function transforms combat damage hits information in RJs based upon expected value tables.

TRIGGERED BY: Repair dispatcher

RESULTING IN:

REPAIR-JOB	(F-E1)
A-COMBINE-RJ	(F-A3)
A-CREATE-RJ	(F-A1)
BOOKKEEPER	(F-E2)
A-ASSIGN-LOSS	(F-A14)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See fioure F-8.

F-E3

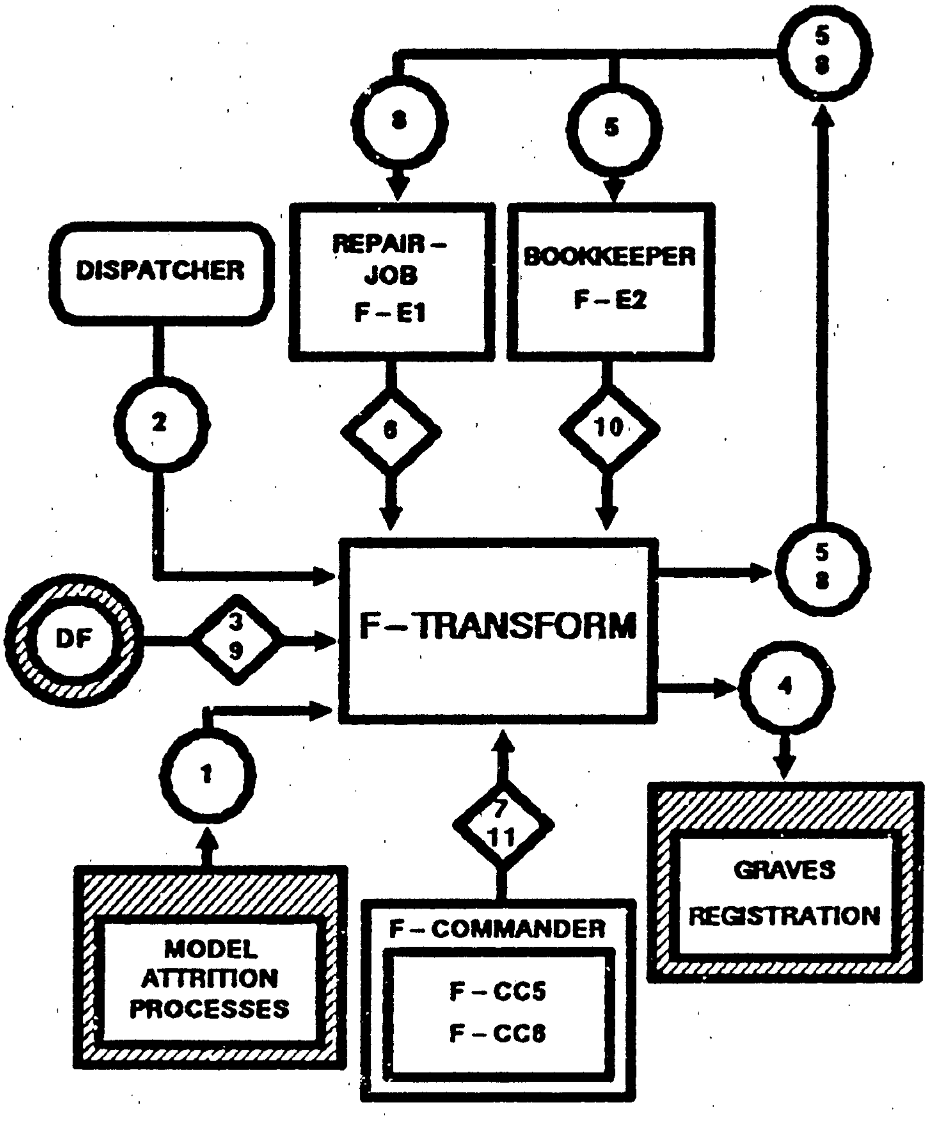

Figure F-8. F-TRANSFORM SSD

DATA DEFINITION: F-TRANSFORM

Connection Number	Data Transferred	Comments
D1	o System/Personnel-Type o Loss-Qty o Round-Type o Unit-ID 'key'	Loss records
D2	o Time-Step-Ending-Time	Function trigger
S3a	o RJ-Types and Probabilities	Personnel/Victim-Type Probability Table F-DF3
S3b	o RJ-Types and Probabilities o System-Type	System-Type/Round Type/Victim-Type Probability Table F-DF4
D4	o Personnel-Type o Loss-Qty o Unit-ID	Message to graves registration
D5	o Personnel/System-Type o Loss-Qty	Trigger A-ASSIGN-LOSS (F-A14)
S6	o RJ State Vector o RJ-ID 'key'	
S7	o Combining-Flag	Repair system-wide flag F-DS5.
D8a	o RJ-ID o Qty	Trigger A-COMBINE-RJ.
D8b	o RJ-Type o Qty o Unit-ID or repair site o Personnel-Type o Contaminated o Current-Time	Trigger A-CREATE-RJ. If personnel RJ. If personnel RJ.

DATA DEFINITION: F-TRANSFORM (cont.)

Connection Number	Data Transferred	Comments
S9	o KIA o Catastrophic losses o GS and hospital-bound	RJ-Types defining Personnel (F-DF5).
S10	o Previous-OH-Qty o System-Type 'key' o Unit-ID 'key'	Saved for use in determining combat losses to unrecovered jobs each cycle.
S11	o Spt-Clearing-Station-Table o Unit-ID 'key'	F-CC6

F-F3

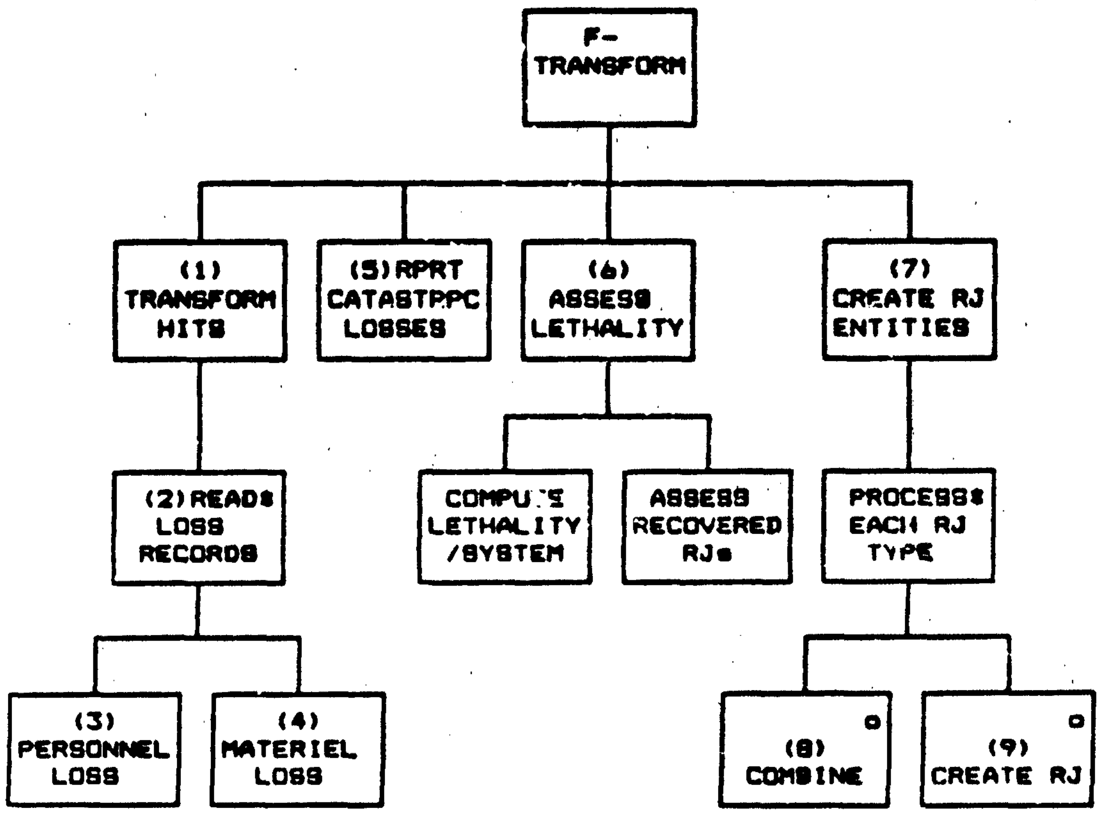

Figure F-9. F-TRANSFORM generator

F-F3

GENERATOR DESCRIPTION: F-TRANSFORM

1. TRANSFORM HITS. Transform the hits into RJ quantities and cumulate for each Loss-Record (D1) of the unit with a Loss-Time less than or equal to the Time-Step-Ending-Time (D2).

2. READ LOSS-RECORD. Read the loss record to determine if the loss type was a personnel or material loss and perform the appropriate transformation.

3. PERSONNEL LOSS. Transform the loss-qty by personnel-type into quantities by RJ-type using the ratios of personnel-type to RJ-types contained in the personnel-type/victim-type probability table (S3a). Add each computed RJ-type quantity to the cumulative RJ-type loss-qty.

4. MATERIEL LOSS. Transform the loss-qty by system-type into quantities by RJ-type using the ratio of system-type to RJ-type contained in the system-type/round-type/victim-type probability table (S3b). Add each computed RJ-type quantity to the cumulative RJ-type loss-qty.

5. REPORT CATASTROPHIC LOSSES. For each RJ type that represents personnel KIA (S9), report the KIA (personnel) losses to the graves registration functional representation (D4). For each RJ type that represents system catastrophic or GS maintenance losses or hospital bound or KIA personnel (S9), invoke A-ASSIGN-LOSS using quantity and system/personnel type as parameters (D5) to reduce the qty-assigned personnel count.

6. ASSESS LETHALITY. Assess the lethality to RJs in units not recovered during previous maintenance cycle. First, compute the lethality for each system type using

K-LOSS-RATIO(ST) = LOSS-QTY(CATASTROPHIC/KIA RJ-TYPE) / PREVIOUS-OH-QTY(ST)

where,

- o K-Loss-Ratio(ST) is passed to F-BATTLE-EFFECTS (F-F5).
- o Loss-Qty is the computed quantity for the catastrophic/KIA RJ-type defined for the given system/personnel type (S9).
- o Previous-OH-Qty (in S10).

Then, assess unrecovered RJs by invoking F-BATTLE-EFFECTS using the Unit ID and the K-Loss-Ratio as parameters.

F-TRANSFORM (cont.)

7. CREATE RJ ENTITIES. Process each RJ type with a non-zero quantity excluding personnel KIAs but including catastrophically damaged systems. If combining is allowed (flag in S7) and an RJ entity exists in the same state, search the RJs for an RJ type at the current location. If it is a non-personnel RJ type or it is at the repair site (given in the Spt-Clearing-Station-Table), or if it is a personnel RJ in the same state with a quantity less than 1.0, then proceed to COMBINE (step 8); otherwise, do CREATE RJ (step 9).

8. COMBINE. Add to the existing job the amount of the loss quantity required to bring it to the quantity 1.0 by immediately invoking A-COMBINE-RJ with the quantity to be added (D8a). If any quantity remains, perform CREATE RJ with the remainder.

9. CREATE RJ. Invoke A-CREATE-RJ (D8b) to create jobs. Create as many RJs with quantity 1.0 as possible and then create one RJ with the remaining quantity (an amount less then 1.0). If unit has been contaminated (see loss records (D1)) then so indicate in the parameter passed. If the RJ is personnel, then the location equals the repair site given in the Spt-Clearing-Station-Table; otherwise, the RJ is non-personnel and the location should equal the Unit-ID.

F-F4 F-RAM/DNBI-INIT TYPE: Interactive Function

SUMMARY: This function computes unit RAM/DNBI losses by resulting RJ types.

TRIGGERED BY: Repair dispatcher

RESULTING IN:

REPAIR-JOB	(F-E1)
A-COMBINE-RJ	(F-A3)
A-CREATE-RJ	(F-A1)
BOOKKEEPER	(F-E2)
A-LOSE-OH	(F-A15)
A-ASSIGN-LOSS	(F-A14)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-10.

F-F4

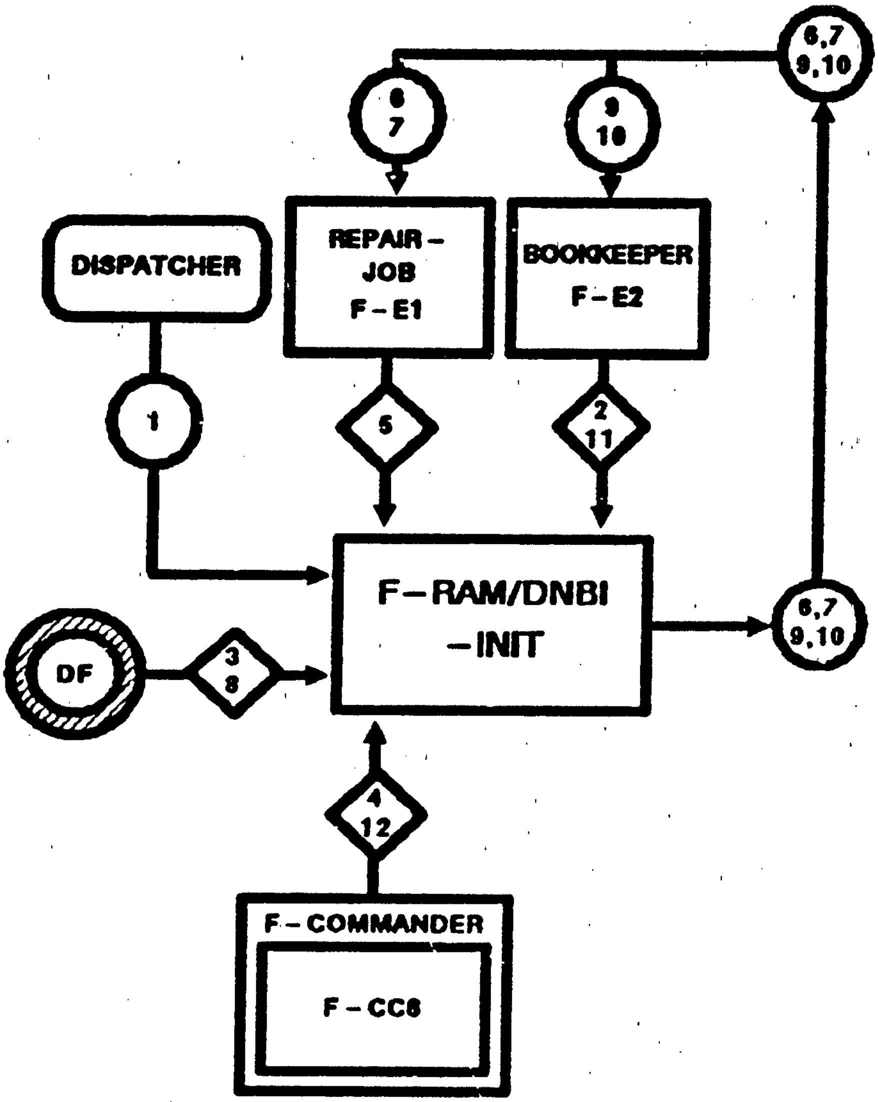

Figure F-10. F-RAM/DNBI-INIT SSD

F-F4

DATA DEFINITION: F-RAM/DNBI-INIT

Connection Number	Data Transferred	Comments
D1	o Time-Inc	Trigger function.
S2	o OH-Str o System/Personnel-Type 'key' o Unit-ID 'key'	
S3	o RJ-Types o Expected-Values o System-Type 'key' o Unit-Activity 'key'	F-DF6
S4	o Combining flag	Repair system-wide flag. F-CC6
S5	o RJ State Vector o RJ-ID	
D6	o RJ-ID o Qty	Trigger an A-COMBINE-RJ.
D7	o RJ-Type o Qty o Unit-ID o Contaminated flag o Current-Time o Personnel/System-Type	Trigger an A-CREATE-RJ.
S8	o RJ-Types defining GS and hospital-bound	F-DF5
D9	o System/Personnel-type o Qty o Unit-ID	Trigger A-LOSE-OH.
D10	o System/Personnel-type o Qty o Unit-ID	Trigger A-ASSIGN-LOSS.
S11	o Unit-Contamination o Unit-Activity o Unit-ID 'key'	The model must record these unit attributes every maintenance cycle.
S12	o Spt-Clearing-Station-Table o Unit-ID 'key'	F-CC6

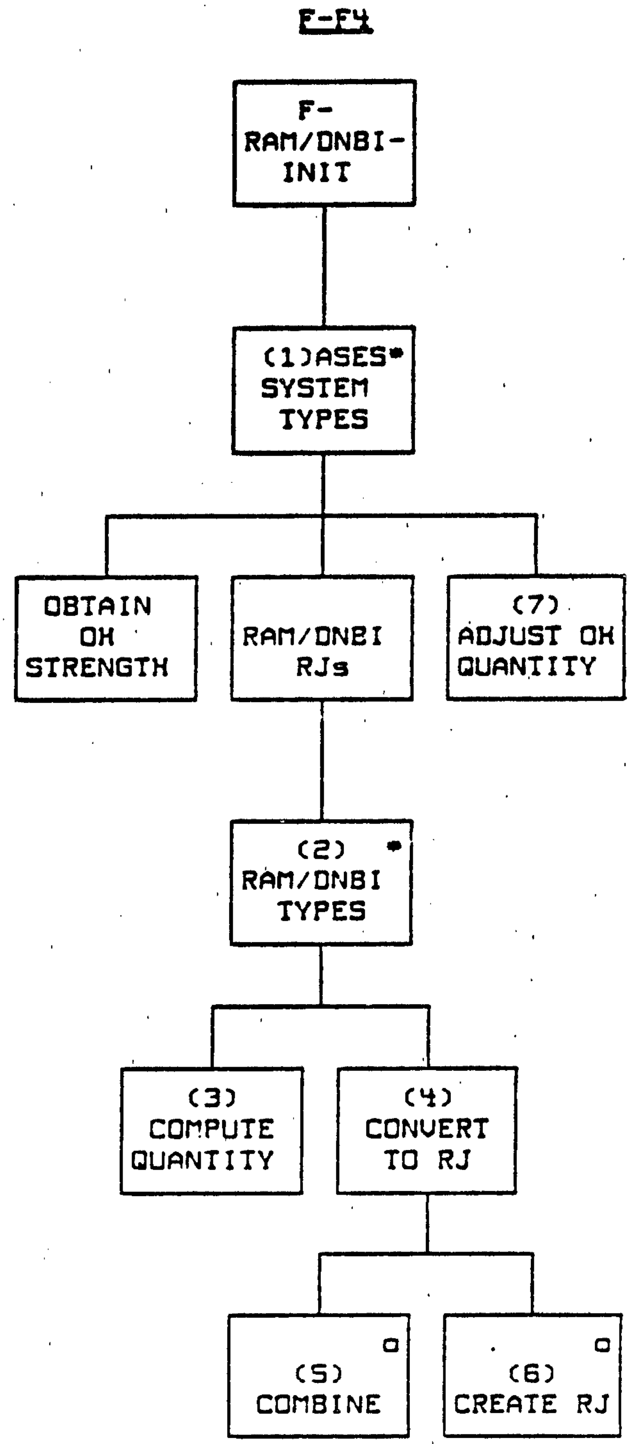

Figure F-11. F-RAM/DNBI-INIT generator

F-F4

GENERATOR DESCRIPTION: F-RAM/DNBI-INIT

1. ASSESS EACH SYSTEM TYPE. Assess each system type in the unit (S2) for on-hand strength (OH-Str) greater than 0 to obtain the OH-Str of system type (S2).

2. RAM/DNBI TYPE. For each RAM/DNBI RJ-type (S3) associated with the system type, COMPUTE QUANTITY (step 3) and CONVERT TO RJ (step 4).

3. COMPUTE QUANTITY. Use the expected value for each RJ type contained in S3, EV(RJ), to compute RJ quantities by multiplying the expected values by the OH-Qty. EV(RJ) is the 24-hour expected value of RJ-type occurance given the unit activity (S3). The unit activity and time increment are given in D1; OH-Qty is given in S2.

4. CONVERT TO RJ. If combining is allowed (flag in S4) and an RJ entity exists in the same state, search the RJs for an RJ type at the current location. If it is a non-personnel RJ type or it is at the repair site (given in the Spt-Clearing-Station-Table), or if it is a personnel RJ in the same state with a quantity less than 1.0, then proceed to COMBINE (step 5); otherwise, do CREATE RJ (step 6).

5. COMBINE. Add enough of the loss quantity to the existing job to bring it up to 1.0 by immediately invoking A-COMBINE-RJ using the quantity being added (D6) as the parameter. Perform CREATE RJ (step 6) with any remainder.

6. CREATE RJ. Invoke A-CREATE-RJ (D7) to create jobs. Create as many RJs with a quantity of 1.0 as possible; then create one RJ with any remainder. If a unit has been contaminated (as determined from the loss records-D1), then so indicate in the action attribute passed. If the RJ is personnel, then the location equals the repair site given in the Spt-Clearing-Station-Table; otherwise, the RJ is non-personnel and the location should equal the unit ID.

7. ADJUST OH-QTY STRENGTHS. Invoke A-LOSE-OH using the cumulative Loss-Qty for the system type as the parameter (D9). For each RJ type that represents GS maintenance losses or hospital-bound personnel (S8), invoke A-ASSIGN-LOSS, with the parameters quantity and system/personnel type (D10), in order to reduce the Qty-assigned count.

F-F5 F-BATTLE-EFFECT TYPE: Interactive Function

SUMMARY: This function generates unrecovered RJ losses to withdraw units in combat.

TRIGGERED BY: Repair dispatcher

RESULTING IN:

REPAIR-JOB	(F-E1)
A-COMBINE-RJ	(F-A3)
A-CREATE-RJ	(F-A1)
A-PASSBACK-RJ	(F-A2)
A-ABANDON-RJ	(F-A12)
BOOKKEEPER	(F-E2)
A-ASSIGN-LOSS	(F-A14)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-12.

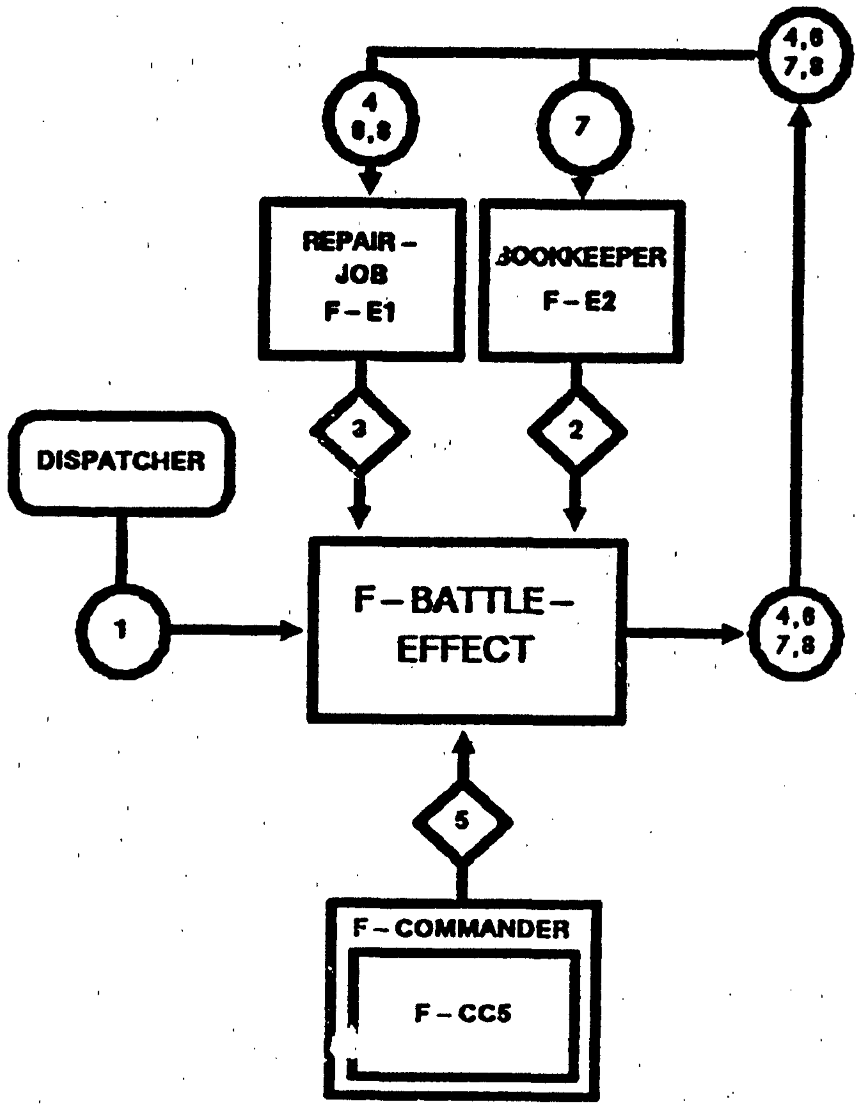

Figure F-12. F-BATTLE-EFFECT SSD

DATA DEFINITION: F-BATTLE-EFFECT

Connection Number	Data Transferred	Comments
D1		Trigger function.
S2a	o New-Unit-Location o Old-Unit-Location o Unit-diameter o Unit-ID 'key'	The model must record these unit state data every maintenance cycle.
S2b	o Old-Support-Unit-Location o Unit-ID 'key'	
S2c	o Combat-Action-Flag o Unit-ID 'key'	
S3	o RJ State Vector o RJ-ID 'key'	
D4	o Qty	Trigger A-PASSBACK-RJ.
S5	o Combining flag	Repair system-wide flag. (F-CC5)
D6a	o RJ-ID o Qty	Trigger A-COMBINE-RJ.
D6b	o RJ-Type o Qty o Unit-ID o Contaminated o Current-Time	Trigger A-CREATE-RJ.
D7	o System/Personnel-Type o Qty o Unit-ID	Trigger A-ASSIGN-LOSS.
D8	o Qty o RJ-ID	Trigger A-ABANDON-RJ.

F-FS

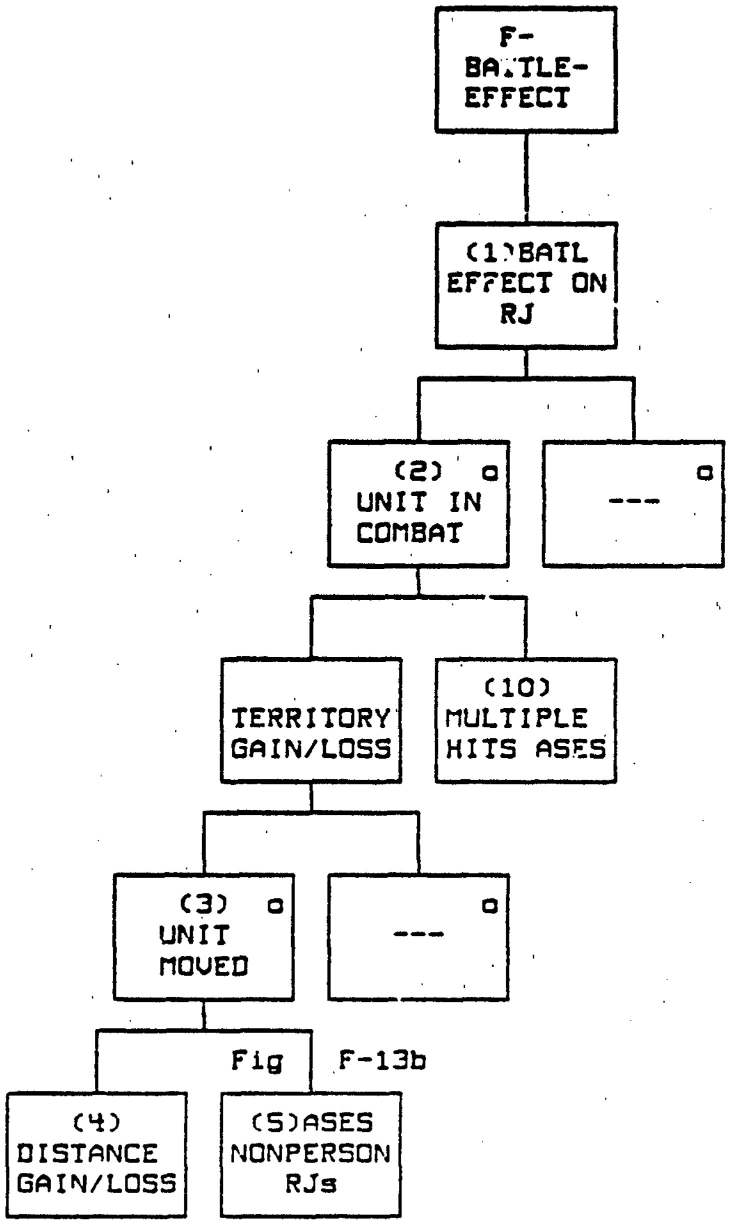

Figure F-13a. F-BATTLE-EFFECT generator

F-FS

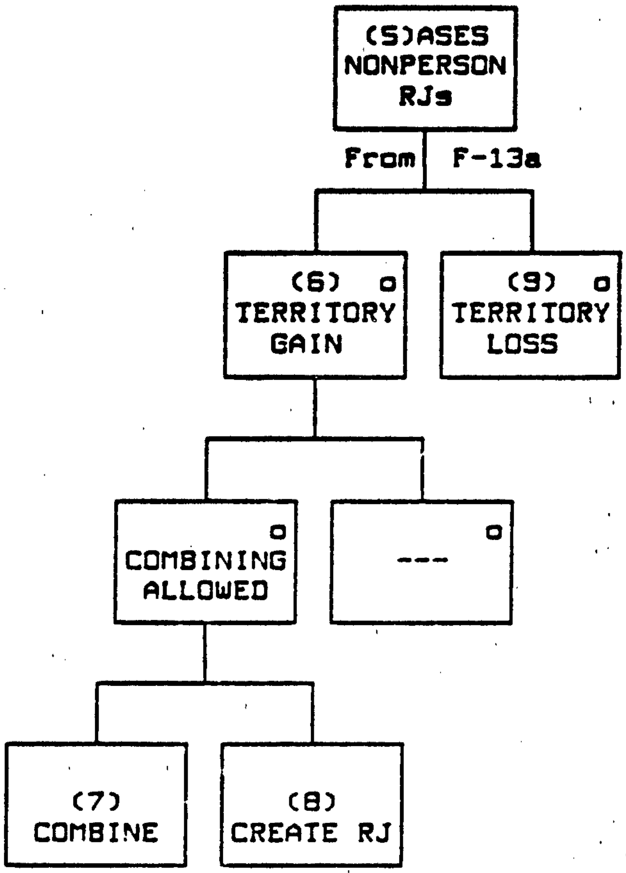

Figure F-13b. F-BATTLE-EFFECT generator (continued)

GENERATOR DESCRIPTION: F-BATTLE-EFFECT

1. BATTLE EFFECTS ON RJ. If a unit has suffered any combat losses (S2c) during the time increment, then it is a UNIT IN COMBAT (steps 2 through 10). Otherwise, the unit is not in combat and there are no combat effects.

2. UNIT IN COMBAT. Compute the movement distance by determining the distance between the New-Unit-Location and the Old-Unit-Location using New-Unit-Location, Old-Unit-Location, the Unit-Diameter in S2a, and the Old-Support-Unit-Location in S2b.

3. UNIT MOVED. If the movement-distance is greater than 0, then the unit has moved. Compute the relative DISTANCE GAIN/LOSS (step 4) and ASSESS NON-PERSONNEL RJs (step 5). If the movement-distance is not greater than 0, the unit did not move and there is no territorial effect.

4. DISTANCE GAIN/LOSS.

AREA-VACATED = MOVEMENT-DISTANCE / UNIT-DIAMETER

Note: This is not a mathematically accurate method for computing the area assuming circular dispersion of a unit; it is accurate for an unchanging rectangular shape and [illegible] enough for corps/division model resolution.

5. ASSESS NON-PERSONNEL RJ. Compute the movement direction using:

MOVEMENT-DIRECTION = (DISTANCE BETWEEN NEW-UNIT-LOCATION AND OLD-SUPPORT-UNIT-LOCATION) MINUS (DISTANCE BETWEEN OLD-UNIT-LOCATION AND OLD-SUPPORT-UNIT-LOCATION).

6. TERRITORIAL GAIN. If the movement direction is positive, then there was a territorial gain, so for each unrecovered RJ, compute the quantity passed back to higher echelons using

QUANTITY-PASSBACK = MIN(1.0,AREA-VACATED) * RJ-QTY.

Invoke A-PASSBACK-RJ using quantity-passback as the parameter. This reduces the quantity of each unrecovered RJ within the unit area that is susceptible to further catastrophic loss. If combining is allowed (S5) and an RJ entity exists in the same state (i.e., search the RJs for a similar RJ-type with a quantity less than 1.0 at the same location in the same state ; because the RJ is passed back to the supporting unit, the search must be of RJs at the supporting unit), then proceed to COMBINE (step 7); otherwise, proceed with CREATE RJ (step 9).

F-BATTLE-EFFECT (cont.)

7. COMBINE. Add enough of the quantity-passback to the existing job to bring the total amount to 1.0 by invoking A-COMBINE-RJ (D6a) using the quantity being added as the parameter. If any quantity is left, perform CREATE RJ (step 8) with the remainder.

8. CREATE RJ. Invoke A-CREATE-RJ to create jobs immediately. Create as many RJs of quantity 1.0 as possible, then create one RJ with any remainder (i.e., any quantity less then 1.0). If the unit has been contaminated (as determined in the original RJ), then so indicate in the action attribute passed. The location of the RJ created should be that of the supporting unit.

9. TERRITORIAL LOSS. For each unrecovered RJ, compute the quantity lost using:

QUANTITY-LOSS = MIN(1.0,AREA-VACATED) * RJ-QTY .

Invoke A-ASSIGN-LOSS using quantity and system type as parameters (D7b) in order to reduce the Qty-assigned equipment count. Use Quantity-Loss and RJ-ID to invoke A-ABANDON-RJ.

10. MULTIPLE HITS ASSESSMENT. For each unrecovered RJ remaining, perform the following loss assessment:

QUANTITY-KILLED = RJ-QTY * K-LOSS-RATIO(ST) .

Note: The K-Loss-Ratio was computed in F-F3. System-type (ST) should be the same as the ST of the RJ.

In order to reduce the Qty-assigned equipment count, invoke A-ASSIGN-LOSS using quantity and system type as parameters (D7). Invoke A-ABANDON-RJ using Quantity-Loss and RJ-ID.

F-F6 F-RECOVERY TYPE: Interactive Function

SUMMARY: This function computes the available recovery capability of a unit for a given time period and allocates the capability to the demanding RJs, updating their states accordingly.

TRIGGERED BY: Repair dispatcher

RESULTING IN: REPAIR-JOB (F-E1)
A-RECOVER-RJ (F-A8)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-14.

F-F6

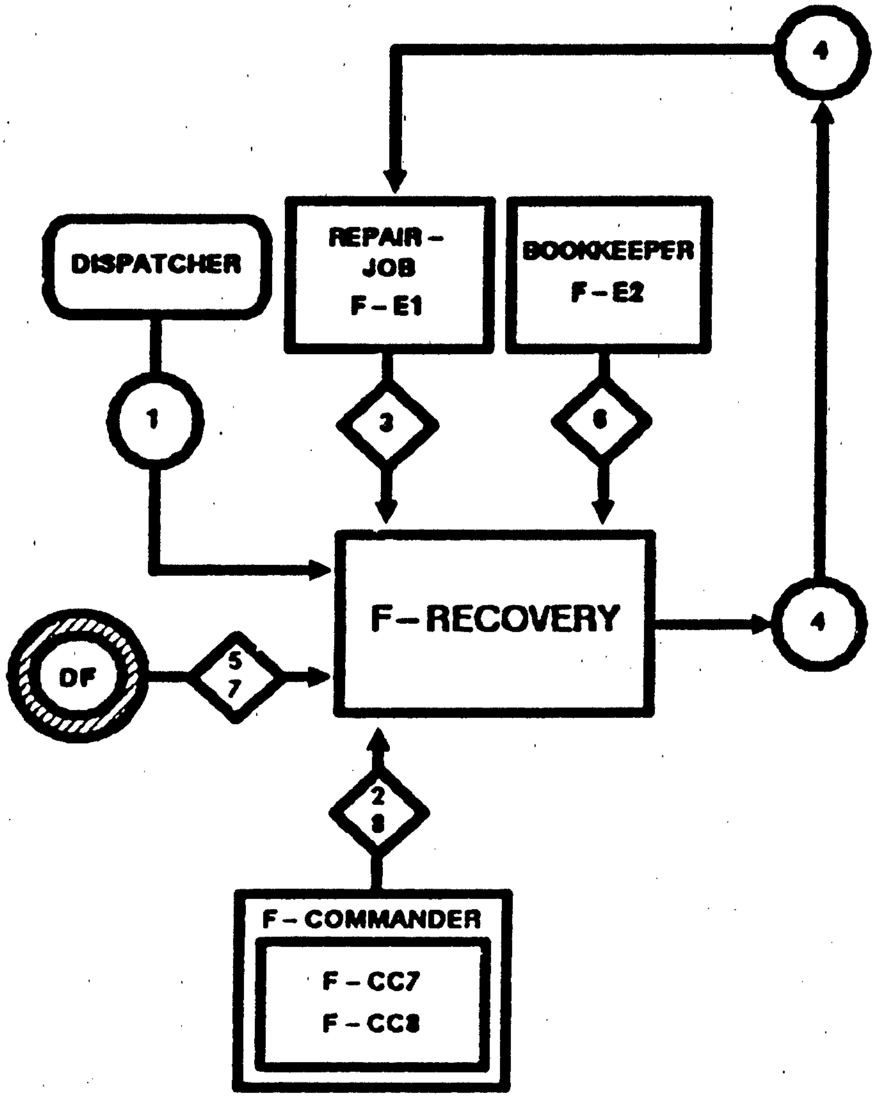

Figure F-14. F-RECOVERY SSD

DATA DEFINITION: F-RECOVERY

Connection Number	Data Transferred	Comments
D1	o Time-Inc	Trigger
S2	o RJ-Rec-Priority-Table o Unit-ID 'key'	F-CC7
S3	o RJ State Vector	
D4	o RJ-ID	Trigger A-RECOVER-RJ.
S5	o RV-Table	F-DF7
S6	o OH-Str	
S7a	o Daily-Avail-RV-RH o Unit-ID 'key' o RV-Type 'key'	F-DF8
S7b	o Like-Rec-Systems	F-DF9
S7c	o Single-RJ-RVH-Req o Unit-ID 'key' o RJ-Type 'key' o Origin 'key' o Destination 'Key'	F-DF10
S8	o RJ-RV-Priorities	F-CC8

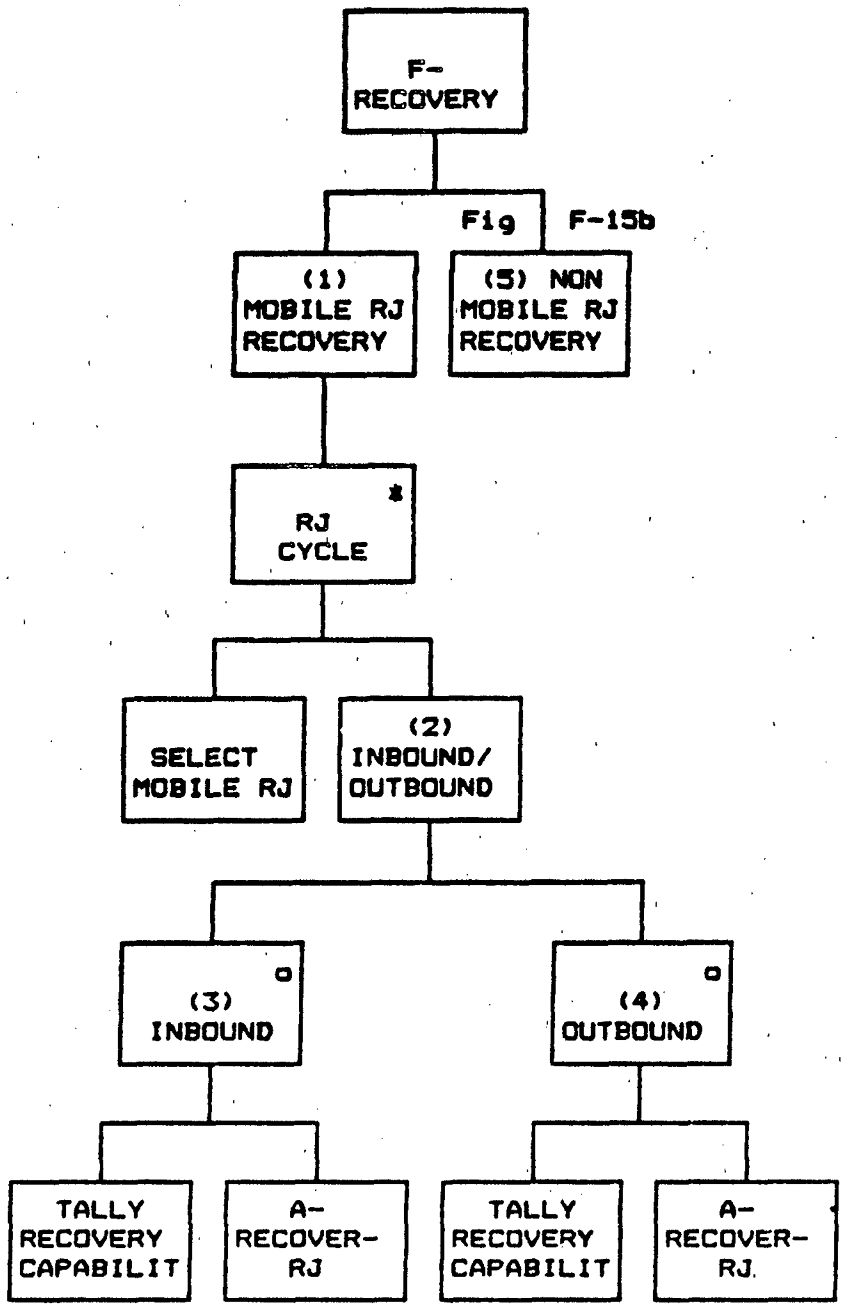

Figure F-15a. F-RECOVERY generator

F-F6

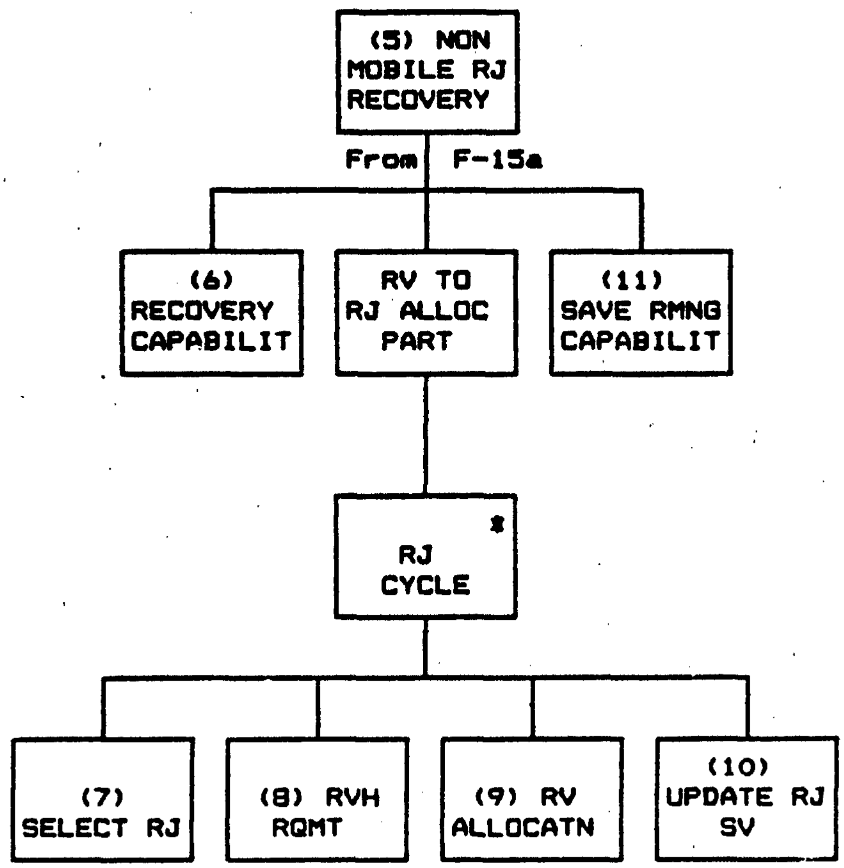

Figure F-15b. F-RECOVERY generator (continued)

GENERATOR DESCRIPTION: F-RECOVERY

1. MOBILE RJ RECOVERY. Cycle through the RJs (step 2 through 4) selecting the next unrecovered mobile RJ (i.e., the mobility flag and either the unrecovered flag or the evac flag are on in S3).

2. INBOUND/OUTBOUND. If an RJ has an unrecovered flag set on, then the RJ is INBOUND (step 3); if the RJ EVAC flag is on and the REC EVAC policy is on, the RH is OUTBOUND (step 4).

3. INBOUND. Tally the like-recovery capability using

LIKE-REC-AVAIL(ST,R/E) = LIKE-REC-AVAIL(ST,R/E) + RJ-QTY

where the ST is the ST of the RJ and R/E = R = Recovery.

Then update the RJ state vector by invoking A-RECOVER-RJ.

4. OUTBOUND. Tally the like-recovery capability using

LIKE-REC-AVAIL(ST,R/E) = LIKE-REC-AVAIL(ST,R/E) + RJ-QTY

where the ST is the ST of the RJ and R/E = E = Evac.

Then invoke A-RECOVER-RJ.

5. NON-MOBILE RJ RECOVERY. First compute the RECOVERY CAPABILITY (step 6), then cycle through the RJs allocating the capability (steps 7 through 10) and perform SAVE REMAINING CAPABILITY (step 11).

6. RECOVERY CAPABILITY. For each recovery vehicle type (S5), compute the recovery capability using:

RVH-AVAIL(RVT) = OH-STR(RVT) [S6] * DAILY-AVAIL-RH [S7]/ (24/TIME-INC) [D1].

Convert Like-Rec-Avail to RVH-Avail(RVT) by multiplying the quantities of Like-Rec-Avail by the RJ-RVH-Req found for non-mobile RJ of the same ST. Keep the RVH-Avail for these systems separated by field recovery=R and unit-to-DS=E categories.

7 SELECT RJ. Select the next non-mobile RJ requiring recovery (S3 shows unrecovered flag on or the evac flag (with non-EAC destination) on).

8. RVH REQUIREMENT. Compute the RJ to RVH requirement using:

RVH-REQ = RJ-QTY * RJ-RVH-REQ (S7C).

F-F6

F-RECOVERY (cont.)

9. RV ALLOCATION. Allocate as many RVH as possible to satisfy the recovery requirement. Allocate RVHs of the RV type in the order listed in the RJ-RV Priority (S8).

10. UPDATE RJ SV. If the recovery requirement has been completely satisfied, then invoke A-RECOVER-RJ immediately. To change the RJ state vector to show recovery, deduct the allocated amounts from RVH-Avail.

11. SAVE REMAINING CAPABILITY. Keep RVH-Avail(RVT) for use by F-RECOVERY-SUPPORT and F-RECOVERY-SHORT.

F-F7 F-RECOVERY-SUPPORT TYPE: Interactive Function

SUMMARY: After a unit has performed its own unit support recovery mission, this function allocates any remaining unit capability for defined direct-support recovery and cross-leveling recovery support relationships. By playing support units in a table listed order S2 and allowing a supported unit to be supported by 0 or more supporting units, any RV allocation and support unit concept can be played. Examples include:

- Unit recovery only; no support provided (i.e., complete decentralization)
- No unit support; all recovery from a support unit (i.e., complete centralization)
- Brigade-wide support only
- Division-wide support only
- Brigade and division support
- Different support structures in different parts of the corps over time

TRIGGERED BY: Repair dispatcher

RESULTING IN: REPAIR-JOB (F-E1)
A-RECOVER-RJ (F-A8)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-16.

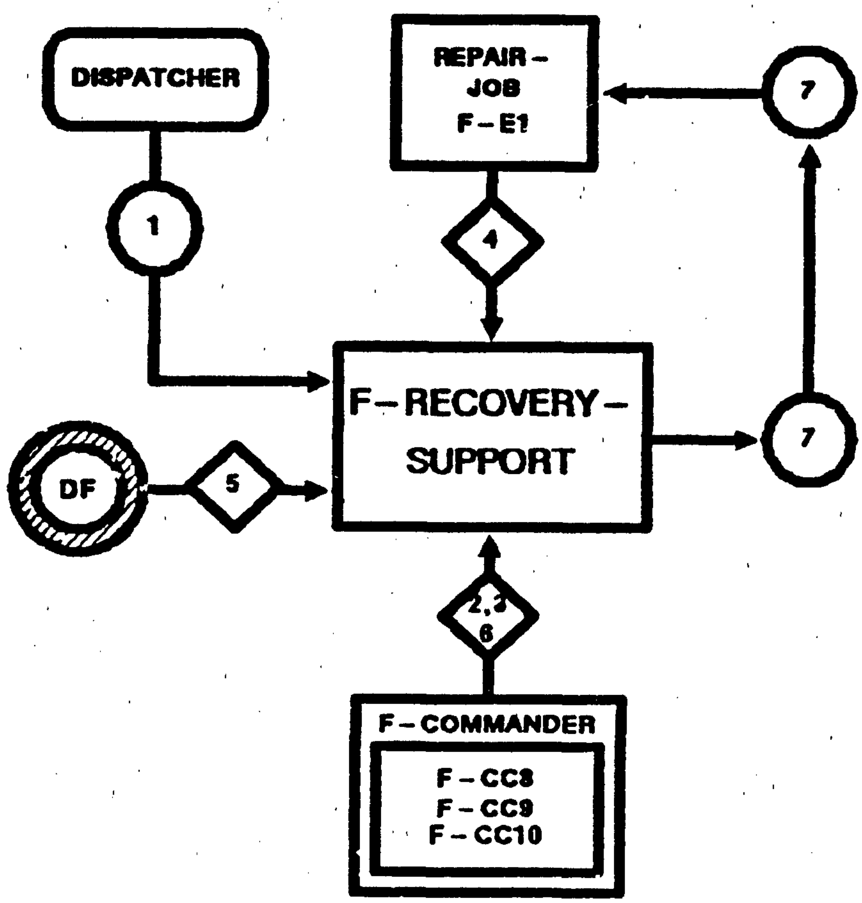

Figure F-16. F-RECOVERY-SUPPORT SSD

DATA DEFINITION: F-RECOVERY-SUPPORT

Connection Number	Data Transferred	Comments
D1		Trigger function.
S2	o Rec-Spt-Unit-Relationship	F-CC9
S3	o Rec-Spt-RA-Priority-Table	F-CC10
S4	o RJ State Vector	
S5	o Single-RJ-RVH-Rep o Unit-ID 'key' o RV-Type 'key'	F-DF10
S6	o RJ-RV-Priorities	F-CC8
D7	o RJ-ID	Trigger A-RECOVER-RJ.

E-FZ

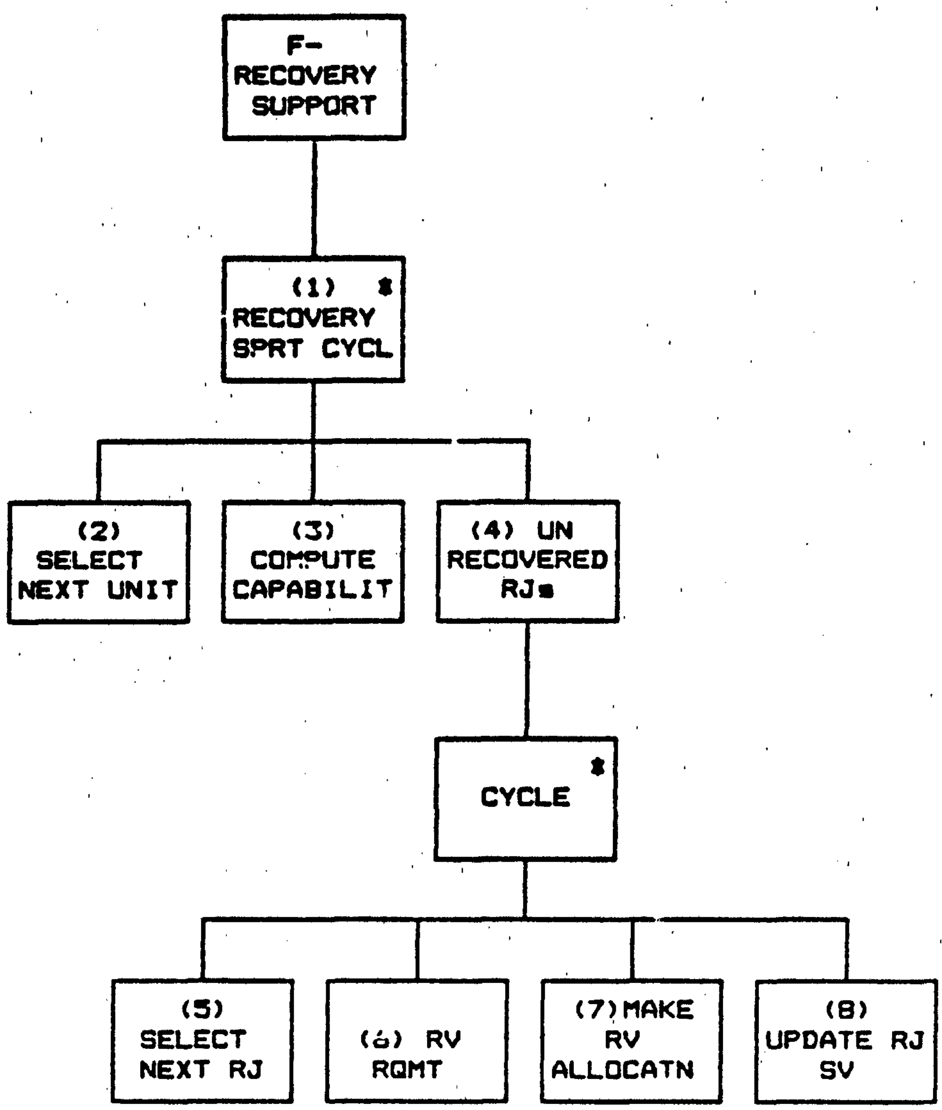

Figure F-17. F-RECOVERY-SUPPORT generator

GENERATOR DESCRIPTION: F-RECOVERY-SUPPORT

1. RECOVERY SUPPORT CYCLE. Cycle through the recovery support units, allocating remaining capability.

2. SELECT NEXT UNIT. If any supporting units have not yet been selected, then select the next recovery support unit (recovery support units identified by the processing order in S2).

3 COMPUTE CAPABILITY. Compute the recovery support capability for each supported unit (supported units identified in S2 include the supporting unit also) using:

SUPPORT-RVH-AVAIL(RVT) = SUPPORT-RVH-AVAIL(RVT) + RVH-AVAIL(RVT)

Where RVH-Avail(RVT) is avail by unit from F-F6 and the RVTs are of recovery vehicles and are not excess like the recovery capability.

4. PROCESS UNRECOVERED RJ. Cycle through the RJs, selecting the next unrecovered RJ (S4 shows unrecovered flag on or the evac flag (with non-EAC destination) on).

5. SELECT NEXT RJ. RJs should be selected in a Recovery-Support-RA-Priority (S3) sequence. Unrecovered RJs in all supported units (D2) should be processed.

6. RV REQUIREMENT. Compute the RJ RVH requirement using:

RJ-RVH-REQ = RJ-QTY * SINGLE-RJ-RVH-REQ

Where Single-RJ-RVH-Req is in S5.

7. MAKE RV ALLOCATION. Allocate as many RVHs as possible to satisfy the recovery requirement. Allocate RVHs of the RV type in the order listed in the RJ-RV priority table (S6).

8. UPDATE RJ SV. If the allocations completely satisfy the requirement, invoke A-RECOVER-RJ (D7) to change the RJ state vector to show recovery. Deduct the allocated amounts from RVH-Avail. If any requirements remain, the RJ remains in the unrecovered state.

F-F8 F-RECOVERY-SHORT TYPE: Interactive Function

SUMMARY: This function represents the utilization of operational systems performing recovery missions when there is a shortfall in the usual recovery capability. It is controlled by a table that shows, for each unit, the utilization thresholds for recovery performance of operational systems. The threshold is a percentage of the authorized quantity of each system. If a unit has some quantity of a system available (on hand) over the threshold amount, that quantity is authorized to perform recovery. If and when this quantity is used for recovery, no check is made against its utilization in its primary mission (i.e., if an operational tank is used to recover another tank, no interface exists to ensure it was not or would not be involved in combat). For this reason, threshold values should be cautiously selected and the extent to which a quantity is used for recovery should be closely monitored for possible double utilization problems.

TRIGGERED BY: Repair dispatcher

RESULTING IN: REPAIR-JOB (F-E1)
A-RECOVER-RJ (F-A8)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-18.

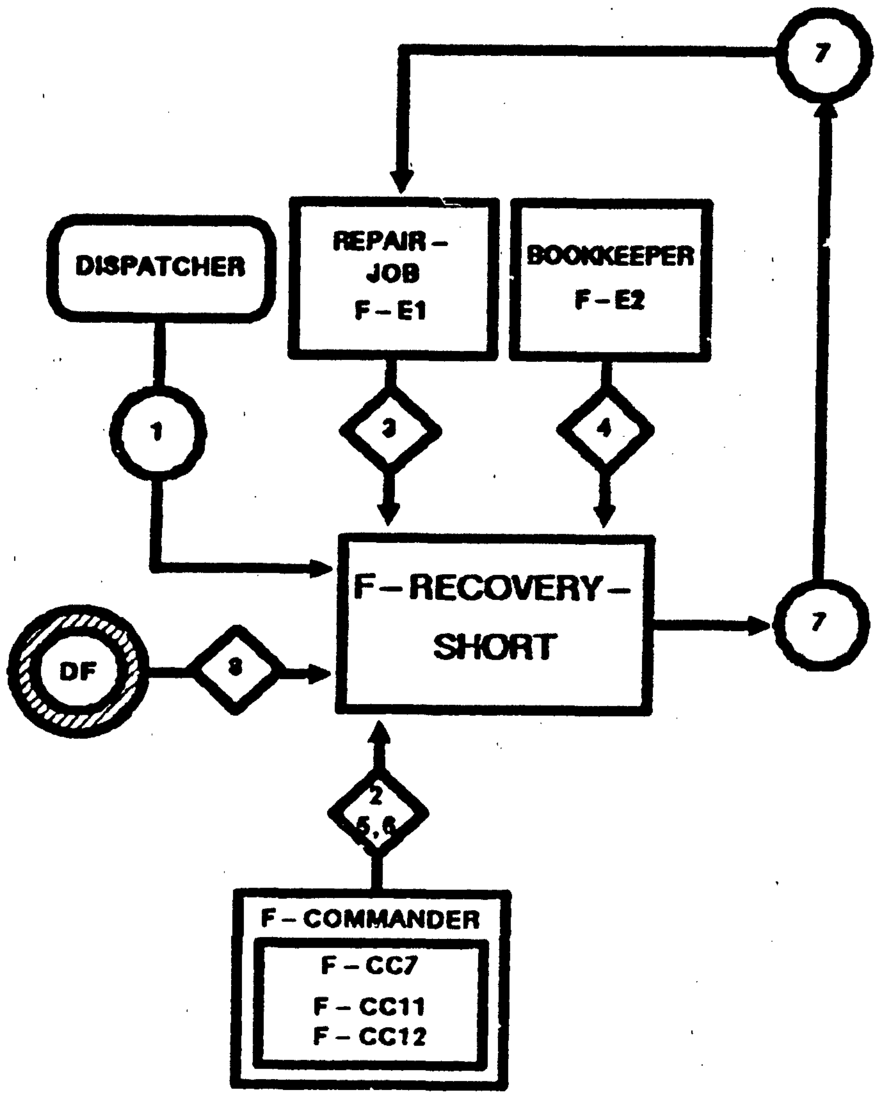

Figure F-18. F-RECOVERY-SHORT SSD

DATA DEFINITION: F-RECOVERY-SHORT

Connection Number	Data Transferred	Comments
D1	o Time-Inc	Trigger function.
S2	o Percent-Avail o System-Type o Unit-ID	Operational-Systems-Like-Recovery-Table (F-CC11).
S3	o RJ State Vector	
S4	o OH-Qty o Auth-Qty o Sys-Type 'key' o Unit-ID 'key'	
S5	o RJ-Rec-Priority-Table o Unit-ID 'key'	F-CC7
S6	o Op-Sys-Like-Rec-Utilization-Pri-Table	F-CC12
D7	o RJ-ID	Trigger 4-RECOVER-RJ.
S8	o Single-RJ-RVH-Req o Unit-ID 'key' o RV-Type 'key'	F-DF10

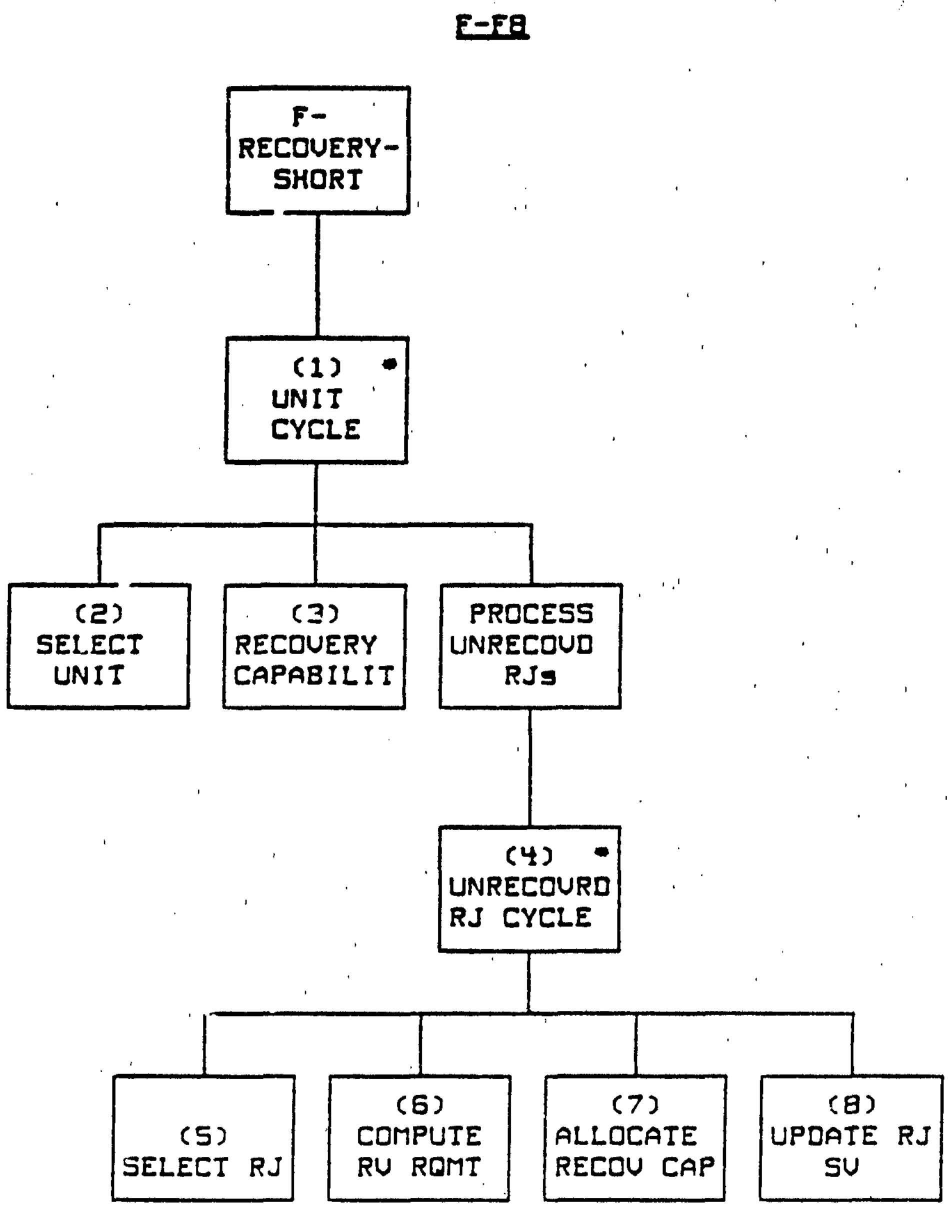

Figure F19. F-RECOVERY-SHORT generator

GENERATOR DESCRIPTION: F-RECOVERY-SHORT

1. UNIT CYCLE. Cycle through the units by SELECTING UNITS (step 2) with unrecovered RJs, computing RECOVERY CAPABILITY (step 3), and then processing UNRECOVERED RJs CYCLE (step 4 through 8).

2. SELECT UNIT. Select the next unit with any unrecovered RJ (examine the RJs in S3).

3. RECOVERY CAPABILITY. Compute the operational systems like-recovery capability for each system type listed in the Operational-Systems-Like Recovery-Table (S2) using:

OP-LIKE-RVH-AVAIL = [OH-QTY(SYS TYPE) - (PERCENT-AVAIL(SYS TYPE) * AUTH-QTY(SYS TYPE))] * TIME-INC

where OH-Qty, Auth-Qty, Percent-Avail are taken from S2 and Time-Inc is obtained from D1.

4. UNRECOVERED RJ CYCLE. Cycle through the unit's RJs, selecting any UNRECOVERED RJ (step 5), computing RV REQUIREMENTS (step 6), allocating RECOVERY CAPABILITY (step 7) and UPDATING THE RJS' STATUS (step 8).

5. SELECT UNRECOVERED RJ. If any unrecovered RJs have not been selected, select the next unrecovered RJ (S3). RJ should be selected in a RJ-Move-Priority-Table (S5) sequence.

6. RV REQUIREMENTS. Compute RJ RVH requirements using:

RJ-RVH-REQ = RJ-QTY * SINGLE-RJ-RVH-REQ.

7. ALLOCATE RECOVERY CAPABILITY. Allocate as many Op-Like-RVH-Avail as possible to satisfy the recovery requirement. Allocate Op-Like-RVH-Avail of the system type in the order listed in the RJ-Op-Sys-Like-Rec-Pri Table (S6). Deduct the allocated amounts from Op-Like-RVH-Avail.

8. UPDATE RJ SV. If the allocations completely satisfy the requirement, invoke A-RECOVER-RJ (D7) to change the RJ state vector to show recovered; otherwise, the RJ will wait unrecovered.

F-F9 F-CONTAMIN-EFFECT TYPE: Interactive Function

SUMMARY: When a unit receives a contaminating attack, all RJs in the unit are contaminated and this function invokes A-CONTAMIN-RJ (F-A4) on the RJs in the unit.

TRIGGERED BY: Repair dispatcher

RESULTING IN: REPAIR-JOB (F-E1)
A-CONTAMIN-RJ (F-A4)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-20.

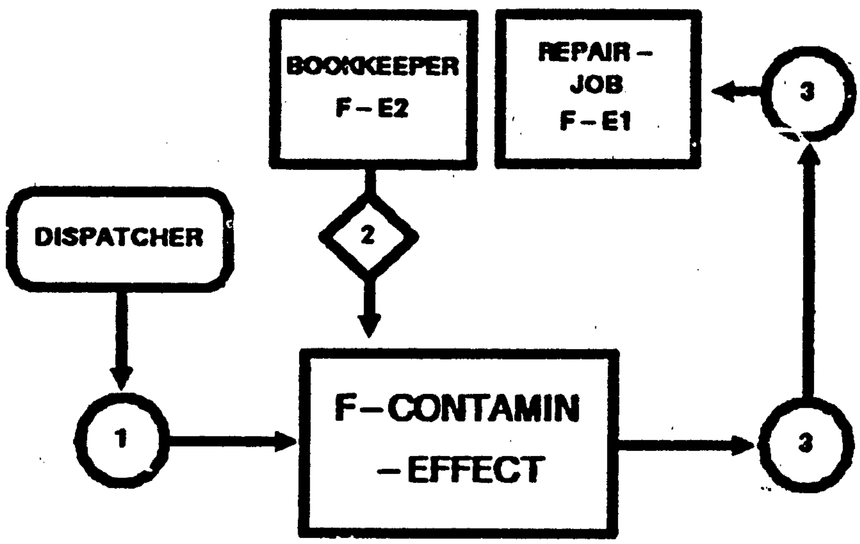

Figure F-20. F-CONTAMIN-EFFECT SSD

DATA DEFINITION: F-CONTAMIN-EFFECT

Connection Number	Data Transferred	Comments
D1		Trigger function.
S2	o Unit-Contaminated-flag	For each maintenance cycle, the model must record whether or not a unit was contaminated during that time period.
D3	o RJ-ID	Trigger A-CONTAMIN-RJ (F-A4).

F-F9

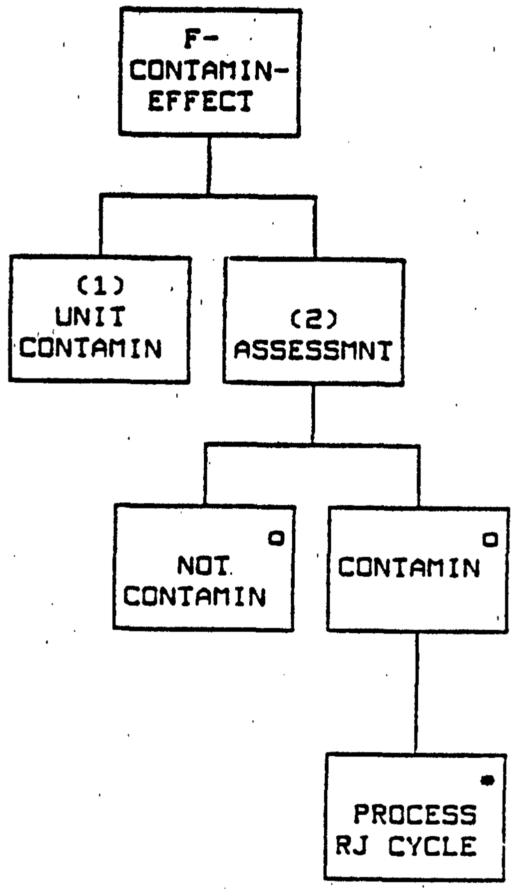

Figure F-21. F-CONTAMIN-EFFECT generator

F-F9

GENERATOR DESCRIPTION: F-CONTAMIN-EFFECT

1. UNIT CONTAMINATION. Read S2 to determine if the unit was contaminated during the maintenance cycle.

2. ASSESSMENT. If it was not contaminated, do nothing. If it was contaminated, cycle through each RJ in the unit invoking A-CONTAMIN-RJ.

F-F10 F-RTNS-ALLOC TYPE: Interactive Function

SUMMARY: This function allocates repaired systems or personnel back to the owning units. Two methods are available for allocation and are employed based upon a flag.

TRIGGERED BY: Repair dispatcher

RESULTING IN: REPAIR-JOB (F-E1)
A-GAIN-OH (F-A16)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-22.

F-F10

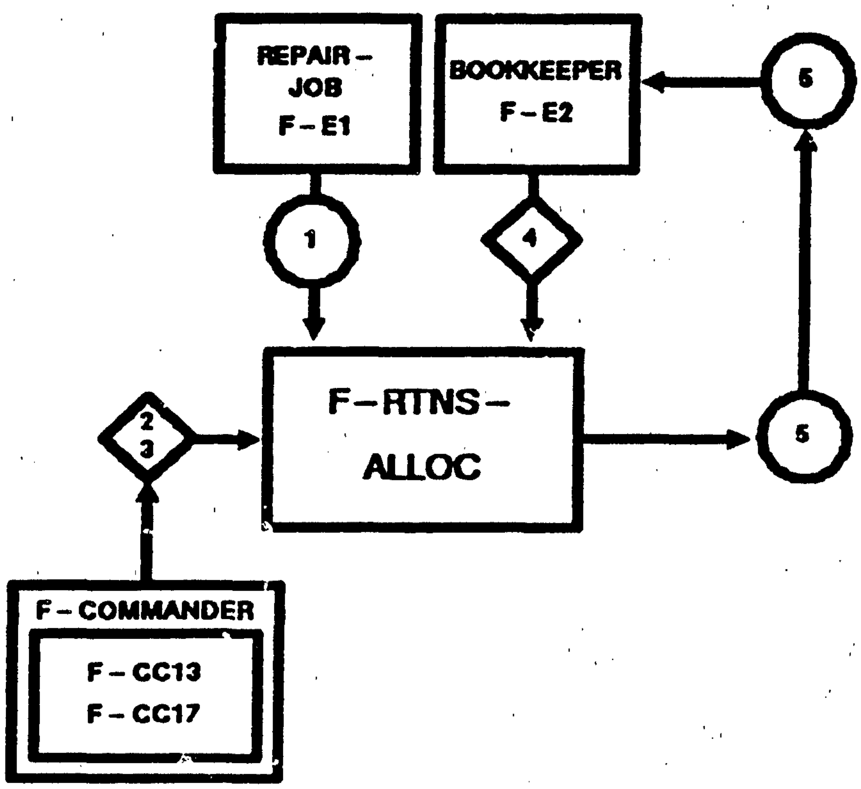

Figure F-22. F-RTNS-ALLOC SSD

F-F10

DATA DEFINITION: F-RTNS-ALLOC

Connection Number	Data Transferred	Comments
D1	o Rtn-Qty	Trigger function.
	o Repair-Site	
	o System/Personnel-Type	
S2	o Priority-Allocation-Flag	F-CC13
	o Repair-Site 'key'	
	o System/Personnel-Type 'key'	
S3	o Supported-Units	F-CC17
	o Repair-Site 'key'	
	o System/Personnel-Type 'key'	
S4	o Assigned-Qty	
	o OH-Qty	
	o Unit-ID 'key'	
	o System/Personnel-Type 'key'	
D5	o Alloc	Trigger A-GAIN-OH.
	o Repair-Site 'key'	
	o System/Personnel-Type 'key'	

F-F10

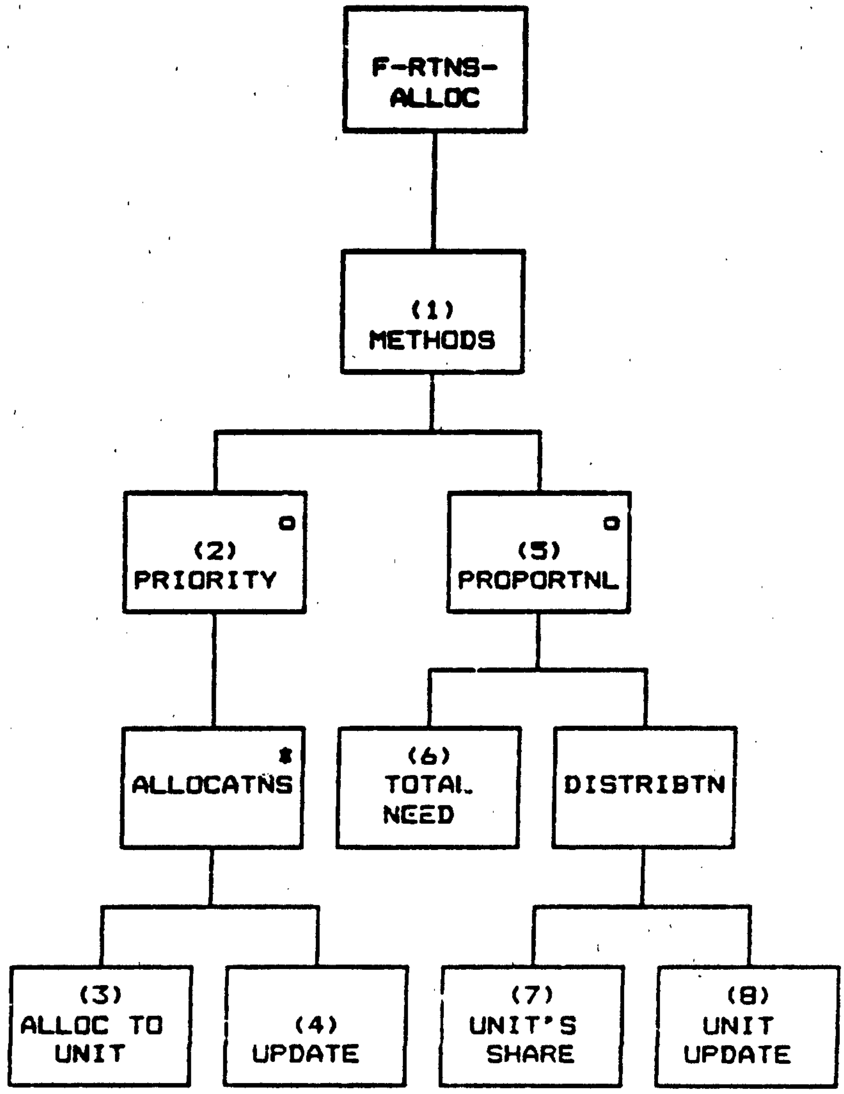

Figure F-23. F-RTNS-ALLOC generator

F-F10

GENERATOR DESCRIPTION: F-RTNS-ALLOC

1. METHODS. If Priority-Alloc is true (S2), then do PRIORITY method (step 2); otherwise, do the PROPORTIONAL method (step 5).

2. PRIORITY. Do ALLOCATIONS (step 3) and UPDATES (step 4) to the unit until the Rtn-Qty is all allocated.

3. ALLOCATE TO UNIT. Select a unit from the prioritized Support-Unit-List (S3).

ALLOC = MIN (RTN-QTY, ASGN-QTY(SYS/PERS-TYPE)-OH-QTY(SYS/PERS-TYPE))

Where: Asgn-Qty and OH-Qty are from S4 and Rtn-Qty = Rtn-Qty - Alloc.

4. UPDATE. Invoke A-GAIN-OH using Unit-ID, System/personnel-Type, and Alloc as parameters (D5).

5. PROPORTIONAL. If it is not priority, compute the TOTAL NEED (step 6) and distribute it according to each unit's share (step 7 and 8).

6. TOTAL NEED. Compute the total allocation base. For each supported unit (S3), cumulate

(ASGN-QTY(SYS/PERS-TYPE) - OH-QTY(SYS/PERS-TYPE)) (S4)

into Alloc-Base.

7. UNIT'S SHARE. For each supported unit (S3), compute the share:

ALLOC = ((ASGN-QTY(SYS/PERS-TYPE) - OH-QTY(SYS/PERS-TYPE)) / ALLOC-BASE) * RTN-QTY.

8. UPDATE UNIT. Invoke A-GAIN-OH using Unit-ID, System/Personnel-Type, and Alloc as parameters (D5).

F-F11 F-EVAC-MANAGER TYPE: Interactive Function

SUMMARY: This function is used to determine which RJs should be moved when a transportation asset becomes available for evacuation.

TRIGGERED BY: Transportation module

RESULTING IN:

REPAIR-JOB	(F-E1)
A-EVACUATE-RJ	(F-A9)
A-EVAC-RJ-EAC	(F-A17)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-24.

F-E11

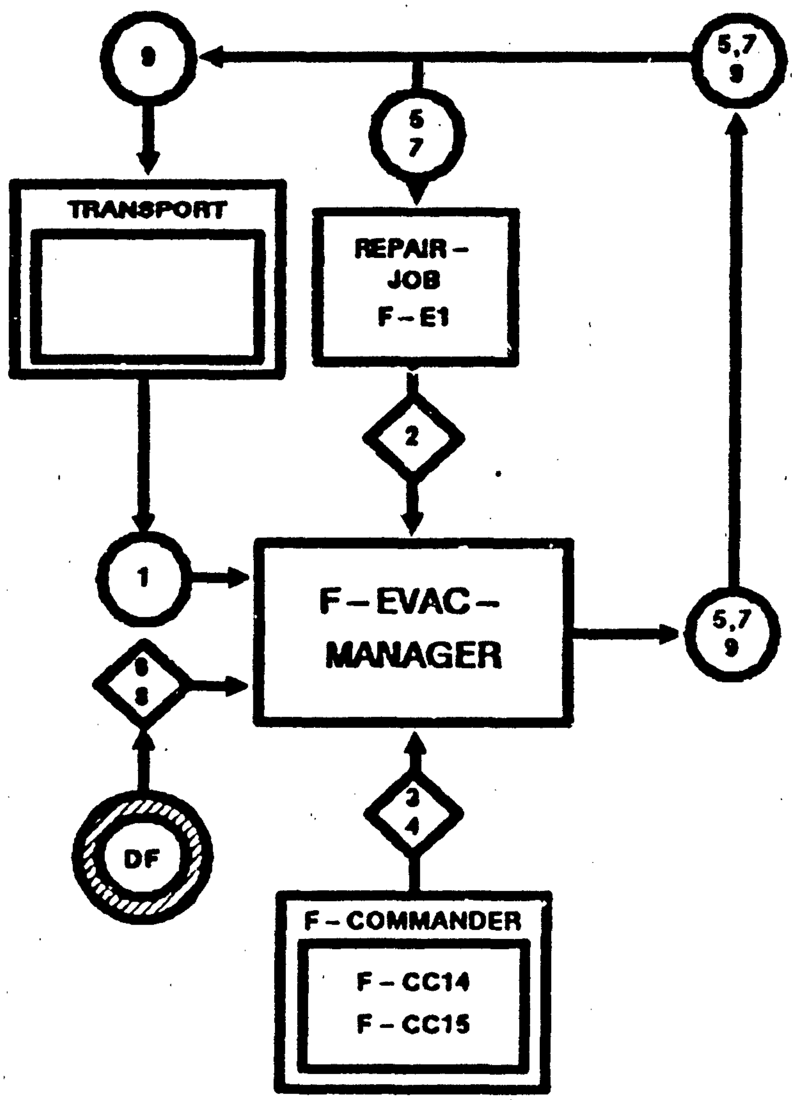

Figure F-24. F-EVAC-MANAGER SSD

F-F11

DATA DEFINITION: F-EVAC-MANAGER

Connection Number	Data Transferred	Comments
D1	o Qtys(Evac-Type)	Trigger function.
S2	o RJ-State-Vector o RJ-ID 'key'	
S3	o RJ-Evac-Priority-Table o Unit-ID 'key'	F-CC14
S4	o Evac-Utilization-Priorities	F-CC15
D5	o RJ-ID o Departure-Flag o Convoy-ID	Trigger A-EVACUATE-RJ.
S6	o Rec-Evac-Capabilities o RJ-Type o Evac system type	F-DF13
D7	o RJ-ID	Trigger A-EVAC-RJ-EAC.
S8	o RJ-Load/Unload-Time o RJ-ID 'key'	F-DF14
D9	o Qtys-Used(Evac-Type) o Evac-Mission-Completion-Time	

F-F11

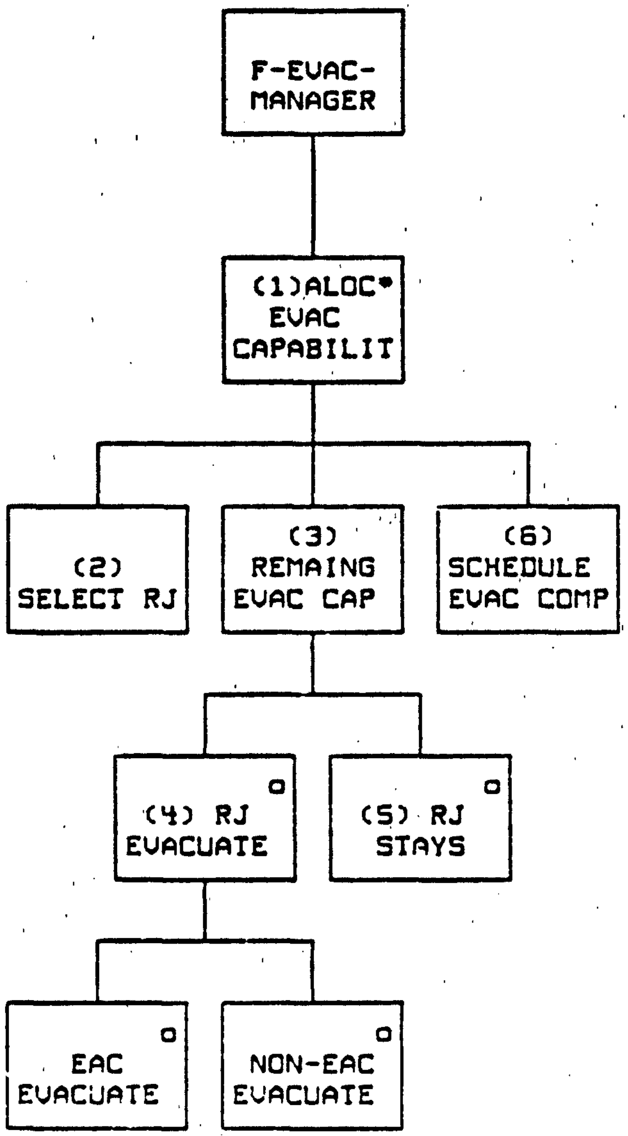

Figure F-25. F-EVAC-MANAGER generator

F-F11

GENERATOR DESCRIPTION: F-EVAC-MANAGER

1. ALLOCATE EVAC CAPABILITY. **Capability(Evac-Type) = Qty(Evac-Type) (D1). First SELECT RJ (step 2), then assess REMAINING EVAC CAPABILITY (step 3), and finally schedule evac completion (step 5).

2. SELECT RJ. While some capability remains, select the next RJ (RJs to evac are identified by evac flags (S2)). RJs should be selected in the order given in the RJ-Evac-Priority-Table (S3).

3. REMAINING EVAC CAPABILITY. If any capability remains to evacuate the selected RJ, then do RJ EVACUATION (step 4); otherwise, do RJ STAYS (step 5). Evac capability is determined by utilizing the RJ-EV-Pri-Table in priority order. If sufficient capability, given Rec-Evac-Capabilities, exists for an evac vehicle type given in the table to satisfy the RJ requirement, then that evac vehicle type will be chosen; otherwise, the next lower priority evac vehicle type in the table is checked.).

4. RJ EVACUATION. Use Rec-Evac-Capabilities (F-DF13) to compute and deduct the amount of capability (Evac-Type) utilized. If the convoy destination is EAC, invoke A-EVAC-RJ-EAC using the RJ-ID; otherwise, the destination is non-EAC, so compute the implicit evac-mission-hours (evac type) using the process in F-GND-IMP-TRAVEL (C-F7) with the computed evac-delivery-time (i.e., the time from the current convoy location to the evac pickup location to the evac delivery location plus the RJ load/unload time (S8)), and the computed convoy-utilization-time (i.e., the computed evac-delivery-time plus the travel time between the delivery location and the convoy return location). Cumulate the weighted evac-delivery-time and convoy-utilization-time by multiplying by the quantity of the evac type used. Invoke A-EVACUATE-RJ using the RJ-ID and the departure flag as parameters (D5).

5. RJ STAYS. Schedule a non-EAC evac completion and convoy return. If the convoy return location is not EAC, then

EV-EVAC-COMPLETION-TIME = CUMULATED WEIGHTED EVAC-DELIVERY -TIME/EVAC VEHICLE QTY USED

EV-CONVOY-UTILIZATION-TIME = CUMULATED WEIGHTED CONVOY -UTILIZATION-TIME/EVAC VEH QTY USED.

6. SCHEDULE EVAC COMPLETION. Schedule F-EVAC-RECEIVER (F-F12), using the Convoy-ID, to occur in EV-Evac-Completion-Time. Return to transportation (D9) the used and unused quantities, EV-Evac-Completion-Time and EV-Convoy-Utilization-Time.

F-F12 F-EVAC-RECEIVER TYPE: Interactive Function

SUMMARY: This function recognizes the arrival of evacuated materiels and triggers the RJ state change to show the RJ at the new repair site.

TRIGGERED BY: Transportation module

RESULTING IN: REPAIR-JOB (F-E1)
A-EVACUATE-RJ (F-A9)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-26.

E-F12

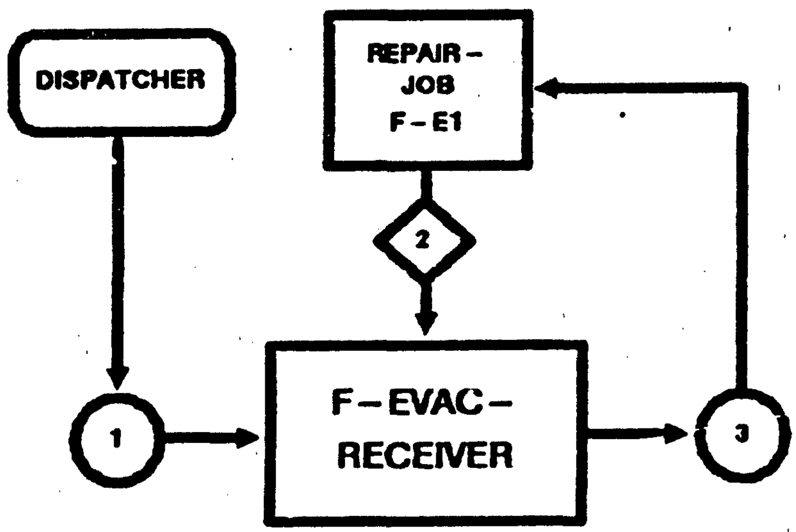

Figure F-26. F-EVAC-RECEIVER SSD

F-F12

DATA DEFINITION: F-EVAC-RECEIVER

Connection Number	Data Transferred	Comments
D1	o Convoy-ID	Trigger function.
S2	o RJ state vector	
D3	o RJ-ID o Arrival-Flag	Trigger A-EVACUATE-RJ.

F-F12

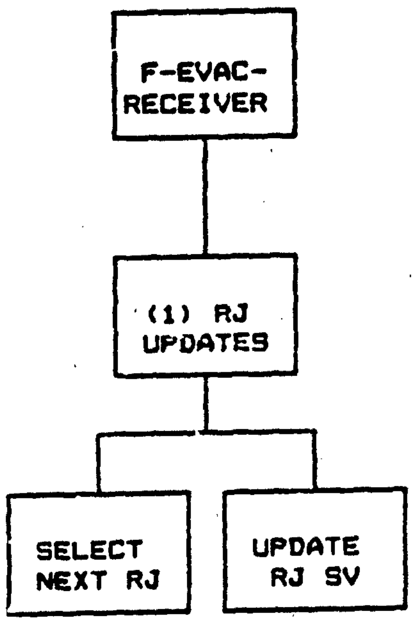

Figure F-27. F-EVAC-RECEIVER generator

F-F12

GENERATOR DESCRIPTION: F-EVAC-RECEIVER

1. RJ UPDATES. For each RJ moved by the evac capability (i.e., match the convoy ID in D1 with the one in S2), select and update the RJ state vector by invoking A-EVACUATE-RJ using the RJ-ID and Arrival-Flag as parameters (D3).

F-F13 F-LOSSES-ALLOC TYPE: Interactive Function

SUMMARY: This function allocates assigned strength losses of personnel and systems (normally treated/repaired and directly returned to their unit) which have been or will be evacuated to a higher repair echelon from which returns are allocated through the personnel and supply channels. If a patient normally treated and directly returned dies, the assigned strength loss must also be allocated.

TRIGGERED BY:	REPAIR-JOB	(F-E1)
	A-EVACUATE-RJ	(F-A9)
	A-DIE-PRJ	(F-A10)
RESULTING IN:	BOOKKEEPER	(F-E2)
	A-ASSIGN-LOSS	(F-A14)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure F-28.

F-F13

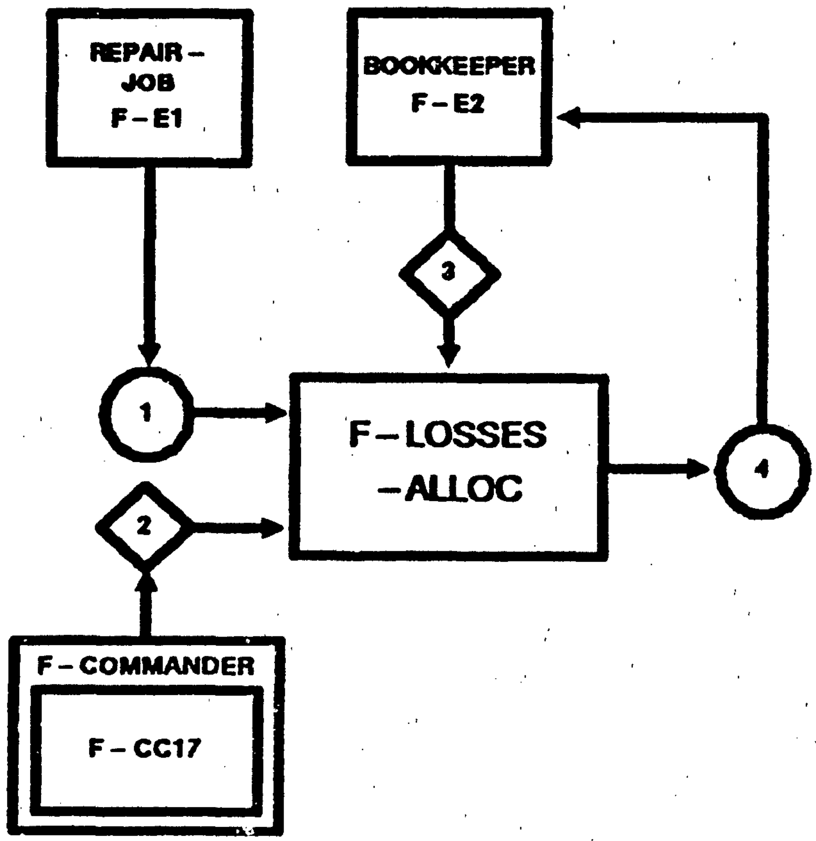

Figure F-28. F-LOSSES-ALLOC SSD

F-F13

DATA DEFINITION: F-LOSSES-ALLOC

Connection Number	Data Transferred	Comments
D1	o Repair site unit ID o RJ-Qty o Personnel/System-Type	Trigger function.
S2	o Supported-Units o Repair-Site 'key' o System/Personnel-Type 'key'	F-CC17
S3	o Assigned-Qty o OH-Qty o System/Personnel-Type 'key' o Unit-ID 'key'	
D4	o Allocation o Unit-ID 'key' o System/Personnel-Type 'key'	Trigger A-ASSIGN-LOSS.

F-F13

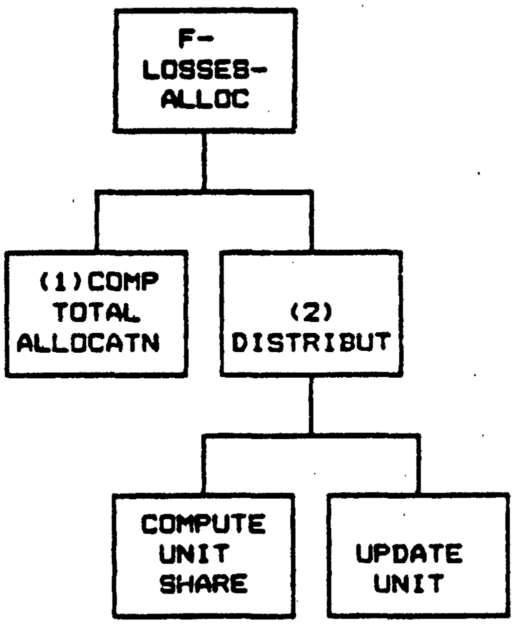

Figure F-29. F-LOSSES-ALLOC generator

F-F13

GENERATOR DESCRIPTION: F-LOSSES-ALLOC

1. COMPUTE TOTAL ALLOCATION. For each supported unit (S2), accumulate (ASGN-QTY(SYS/PERS-TYPE) - OH-QTY(SYS/PERS-TYPE)) (S3) into the Alloc-Base.

2. DISTRIBUTION. Compute the share for each supported unit (S2):

ALLOC = ((ASGN-QTY(SYS/PERS-TYPE) - OH-QTY(SYS/PERS-TYPE))
/ALLOC-BASE) * RJ-QTY

and update the unit status by invoking A-ASSIGN-LOSS using the Unit-ID, System/Personnel-Type, and Alloc as parameters (D4).

APPENDIX G

DECONTAMINATION

The decontamination appendix includes the sections listed below. Note that reference numbers are coded to indicate both the functional area (the appendix letter [G] is used) and the type (E = entity, A = action, F = function) involved. Thus, G-A1 refers to the first action listed in decontamination (appendix G). For information on the JSD diagram notation discussed, see appendix A.

1. Entity list. The entity list contains the reference number, the name, and the definition (summary and attributes) of each entity used in decontamination.

2. Action list. The action list contains the reference number, the name, and the definition (summary, attributes, generators, and associated entities) of each action belonging to the entities in decontamination.

3. Entity-action diagrams and cross-reference table. The cross-reference table provides a mapping of entities and actions. One JSD entity-action structure diagram is provided for each entity. Following each diagram is a narrative description of each action shown.

4. Generator function list. The function list contains the reference number, name, and definition (summary, triggering mechanisms, and resulting actions) of each function associated with decontamination. Detailed descriptions of each function are contained in the annex.

5. Annex. The contents of the annex are as follows:

a. Dispatcher. The dispatcher serves as a road map to the functions. It is not a JSD structure diagram, but it is presented in tree form to show the hierarchical nature of the structure involved. The root of the tree is the dispatcher. The top-level nodes (boxes) identify the critical events occurring in decontamination and the subsequent nodes (boxes) identify the functions and show the interrelationships involved. The calling routines and triggering mechanisms for each critical event are listed above the event node. The actions and events caused by a function are listed below the function node. Each critical event is numbered for identification purposes only; no ordering is implied. The event scheduler (SCHED) uses the critical event numbers to identify the event being scheduled by a function.

5. Annex (cont.)

b. Functions. The following information is provided for each function belonging to decontamination. Note that the reference number of the function (e.g., 6-F1) appears at the top of each page.

(1) Function summary. The function summary contains the reference number, name, and definition of a function. The definition contains a summarized narrative, a list of the mechanisms which can trigger the function, and a list of the actions and functions which can result from the function.

(2) System specification diagram (SSD). The SSD is a JSD structure diagram of the data flow to and from a specified function. It shows the static relationships between the entities and functions involved; no calling sequence or hierarchical relationship is implied. In addition to the standard JSD SSD notation (see appendix A), special notation has been adopted to indicate ownership. A single box is used to denote a function or entity belonging to the specified functional area (e.g., decontamination). Plain double boxes indicate functions belonging to another CSS area. The area is identified in the outer box and the functions involved are listed in the inner box. Patterned double boxes (diagonal slashes in the outer boxes) indicate functions belonging to the host model. Whenever possible, the particular module is specified in the inner box (e.g., chemical, movement). A timer is considered part of the CSS module and is represented by a plain double circle; data files (DF) will belong to the entire model and are depicted by a patterned double circle. Note that although more than one data file (or timer) may be used by the specified function, only one representation (circle) will appear in the diagram. The individual data files and timers will be identified in the corresponding data definition table.

(3) Data definition. This table provides a listing of the data elements and structures required for the specified function and comments on their usage. The connection numbers correspond to the data flow numbers shown on the SSD. A "D" or "S" is added to distinguish between data and state vector elements. Detailed descriptions of the data files can be found in appendices J and K.

(4) Generator diagram. The generator diagram is similar to the JSD entity-action diagrams described in paragraph 3 above. Each node (box) depicts either an iteration, a selection, or a sequential step required by the process.

(5) Generator description. The generator description provides a detailed narrative of the function process. Step numbers correspond to the box numbers shown on the associated generator diagram. (Note that not all boxes are assigned a number.) Data elements cited refer to the data listed in the associated data definition table.

1. ENTITY LIST

G-E1 DECON-UNIT

SUMMARY: This entity represents any unit which performs deliberate decontamination operations. A DECON-UNIT will exist as a real unit in the model and as such will have all of the normal unit attributes. In addition, it will maintain an inventory of decon equipment and supplies. A DECON-UNIT can receive orders to perform detailed personnel and/or equipment decontamination, move to another decon site, perform detailed decontamination, use and receive equipment and supplies, and rest. Site preparation and cleanup will be handled as a delay factor added to the decon process.

ATTRIBUTES:

Unit ID	Unit opcode
MOPP level	Unit status
Unit suppression	Unit effectiveness
Personnel inventory	Unit location
Decon equipment/supply inventory	

G-E2 D-CUSTOMER

SUMMARY: This entity represents any contaminated unit which is to receive deliberate decontamination. When a unit in the game is contaminated, a decision is made regarding what decon (hasty, deliberate, none) should be used. If deliberate decon is selected, the unit becomes a decon customer (D-CUSTOMER) and as such will be able to be split (into a parent unit and a temporary D-CUSTOMER unit), move to a designated decon site, use its equipment and supplies in the decon process, undergo decontamination, return to its original location, and rejoin its parent unit (as the need arises).

ATTRIBUTES:

Unit ID	Unit status
MOPP level	Unit opcode
Unit suppression	Unit effectiveness
Personnel inventory	Unit location
Equipment/supply inventory	

2. ACTION LIST

G-A1 A-BEGIN-DECON

SUMMARY: The BEGIN-DECON action notifies the D-CUSTOMER and the DECON-UNIT that the decontamination process has begun by setting their status flags and removing the amount of equipment and supplies to be used by the process (calculated in F-DECON) from the inventory.

ATTRIBUTES:
- D-CUSTOMER unit ID
- D-CUSTOMER status
- DECON-UNIT ID
- DECON-UNIT status
- Decon equipment/supply inventory
- Amount of equipment/supplies used

GENERATOR: F-DECON (G-F6)

ENTITY: DECON-UNIT (G-E1) D-CUSTOMER (G-E2)

G-A2 A-END-DECON

SUMMARY: The END-DECON action notifies the DECON-UNIT and D-CUSTOMER when the decon process has been completed by resetting the unit status flags and the MOPP level.

ATTRIBUTES:
- DECON-UNIT ID
- DECON-UNIT status
- D-CUSTOMER Unit ID
- D-CUSTOMER status
- D-CUSTOMER MOPP Level

GENERATOR: F-DONE DECON (G-F7)

ENTITY: DECON-UNIT (G-E1) D-CUSTOMER (G-E2)

G-A3 A-DETACH

SUMMARY: The DETACH action is triggered when only a portion of the contaminated unit is to be decontaminated. The DETACH action removes a designated percentage of each equipment, supply, and personnel type from the parent unit and transfers it to the newly created unit.

ATTRIBUTES:
- Parent unit ID
- Unit status
- Parent equipment/supply/personnel inventory
- D-CUSTOMER unit ID
- Percentage to detach
- D-CUSTOMER equipment/supply/personnel inventory

GENERATOR: F-DETACH (G-F4)

ENTITY: D-CUSTOMER (G-E2)

G-A4 A-ATTACH

SUMMARY: The ATTACH action reunites the temporary D-CUSTOMER and its parent unit by returning the D-CUSTOMER's personnel and equipment/supply inventories to the parent unit.

ATTRIBUTES:
- Parent (contaminated) unit ID
- Parent equipment/supply inventory
- Parent personnel inventory
- D-CUSTOMER (Temporary) ID
- D-CUSTOMER personnel inventory
- D-CUSTOMER equipment/supply inventory

GENERATOR: F-DECON-ATOBJ (G-F5)

ENTITY: D-CUSTOMER (G-E2)

G-A5 A-BEGIN-REST

SUMMARY: The BEGIN-REST action notifies the DECON-UNIT of the beginning of its rest cycle by setting its unit status flag.

ATTRIBUTES: DECON-UNIT ID; Unit status flag

GENERATOR: F-DONE-DECON (G-F7); F-DECON (G-F6)

ENTITY: DECON-UNIT (G-E2)

G-A6 A-END-REST

SUMMARY: The END-REST action notifies the DECON-UNIT when it is time to wake up and enter its work cycle by resetting its unit status flag.

ATTRIBUTES: DECON-UNIT ID; Unit status flag

GENERATOR: F-DECON-AVAIL (G-F2); F-DECON (G-F6)

ENTITY: DECON-UNIT (G-E2)

3. CROSS-REFERENCE AND ENTITY-ACTION-DIAGRAMS

ENTITY		ACTION	
DECON-UNIT	(G-E1)	A-BEGIN-DECON	(G-A1)
		A-END-DECON	(G-A2)
		A-BEGIN-REST	(G-A5)
		A-END-REST	(G-A6)
D-CUSTOMER	(G-E2)	A-DETACH	(G-A3)
		A-BEGIN-DECON	(G-A1)
		A-END-DECON	(G-A2)
		A-ATTACH	(G-A4)

G-E1

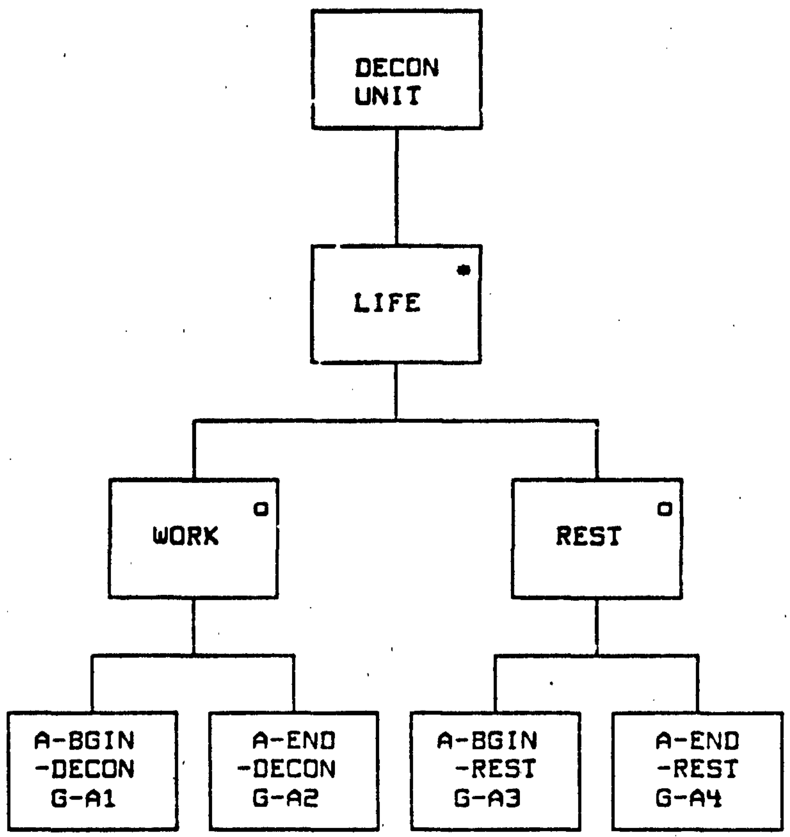

Figure G-1. Entity-action diagram for DECON UNIT

Entity-Action Description: DECON-UNIT (G-E1)

1. A-BEGIN-DECON (G-A1). The BEGIN-DECON action is triggered by F-DECON (G-F6) and notifies the D-CUSTOMER and the DECON-UNIT that the decontamination process has begun by setting their status flags and removing the amount of equipment and supplies to be used by the process from the DECON-UNIT inventory. The information required includes:

- D-CUSTOMER unit ID
- D-CUSTOMER status
- DECON-UNIT ID
- DECON-UNIT status
- Decon equipment/supply inventory
- Amount of equipment/supplies to be used

2. A-END-DECON (G-A2). The END-DECON action notifies the DECON-UNIT and D-CUSTOMER when the decon process has been completed by resetting the unit status flags and the D-CUSTOMER MOPP level and setting the DECON-UNIT's current D-CUSTOMER slot to 0. The required information includes:

- DECON-UNIT ID
- DECON-UNIT status
- D-CUSTOMER unit ID
- D-CUSTOMER status
- D-CUSTOMER MOPP level

3. A-BEGIN-REST (G-A5). The BEGIN-REST action notifies the DECON-UNIT of the beginning of its rest cycle by changing its status flag. The required information includes:

- DECON-UNIT ID
- Unit status flag

4. A-END-REST (G-A6). The END-REST action notifies the DECON-UNIT when it is time to wake up and enter its work cycle by resetting its status flag. The required information includes:

- DECON-UNIT ID
- Unit status flag

G-E2

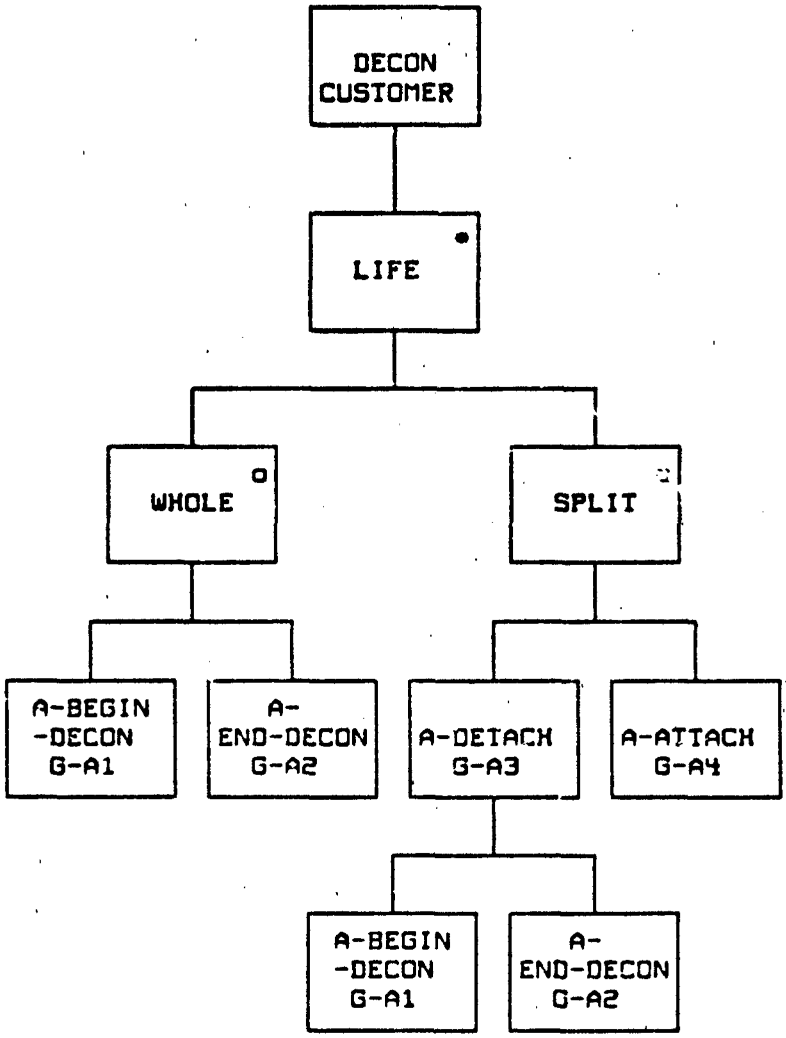

Figura G-2. Entity-action diagram for DECON CUSTOMER

Entity-Action Description: D-CUSTOMER (G-E2)

1. A-BEGIN-DECON (G-A1). The BEGIN-DECON action is triggered by F-DECON (G-F6) and notifies the D-CUSTOMER and the DECON-UNIT that the decontamination process has begun by setting their status flags and removing the amount of equipment and supplies to be used by the process from the unit inventory. The information required includes:

- o D-CUSTOMER unit ID
- o D-CUSTOMER status
- o DECON-UNIT ID
- o DECON-UNIT status
- o Decon equipment/supply inventory
- o Amount of equipment/supplies to be used

2. A-END-DECON (G-A2). The END-DECON action notifies the DECON-UNIT and D-CUSTOMER when the decon process has been completed by resetting the unit status flags and the D-CUSTOMER MOPP level and setting the DECON-UNIT's current D-CUSTOMER slot to 0. The required information includes:

- o DECON-UNIT ID
- o DECON-UNIT status
- o D-CUSTOMER unit ID
- o D-CUSTOMER status
- o D-CUSTOMER MOPP level

3. A-DETACH (G-A3). The DETACH action is triggered when the decision has been made to have the contaminated unit undergo decontamination in sections. A temporary D-CUSTOMER is created by removing or splitting off a portion of the contaminated unit. The percentage to be removed depends upon the type of unit involved. DETACH removes the designated percentage of each equipment, supply, and personnel type from the parent unit and transfers it to the new temporary unit. The split-off portion will then act as an independent unit (i.e., it will be able to perform all the actions of a regular unit) until it has been decontaminated and reattached to its parent. The required information includes:

- o Parent (contaminated) unit ID
- o Unit type
- o Parent equipment/supply inventory
- o Parent personnel inventory
- o D-CUSTOMER (temporary) ID
- o Percentage to detach
- o D-CUSTOMER personnel inventory
- o D-CUSTOMER equipment/supply inventory

4. A-ATTACH (G-A4). The ATTACH action reunites the temporary D-CUSTOMER and its parent unit by transferring the D-CUSTOMER's personnel and equipment/supply inventories to the parent unit.

- o Parent (contaminated) unit ID
- o Parent equipment/supply inventory
- o Parent personnel inventory
- o D-CUSTOMER (temporary) ID
- o D-CUSTOMER personnel inventory
- o D-CUSTOMER equipment/supply inventory

4. GENERATOR FUNCTION LIST.

G-F1 F-DECISION

SUMMARY: This function can be called by either the chemical module or a game controller when a decision is needed on whether the D-CUSTOMER requires deliberate decon, hasty decon, or no decon.

TRIGGERED BY: Chemical module   Game controller

RESULTING IN: F-PREPARE (G-F3)
Request on the queue/dropped

G-F2 F-DECON-AVAIL

SUMMARY: This function is called when a DECON-UNIT is available for a job (i.e., when it has at least one empty slot in its D-CUSTOMER list and it is not "at rest"). A decon request is removed from the control queue and checked to see if the designated unit still needs decontamination. If it does, the unit is added to the DECON-UNIT's standby list. If not, the request is discarded and the next request checked.

TRIGGERED BY: F-DECON-ATOBJ	(G-F5)	F-DECON	(G-F6)
F-DONE-DECON	(G-F7)		

RESULTING IN: F-PREPARE	(G-F3)
DECON UNIT	G-E1)
A-END-REST	(G-A6)

G-F3 F-PREPARE

SUMMARY: This function determines the D-CUSTOMER percentage to be detached, the amount of supplies required, the amount of supplies to order, and the decon site.

TRIGGERED BY: F-DECISION	(G-F1)	F-DECON	(G-F6)
F-DECON-AVAIL	(G-F2)	F-DONE-DECON	(G-F7)
F-DECON-ATOBJ	(G-F5)	F-DONE-CUSTOMER	(G-F8)

RESULTING IN: Movement module
F-JF-RQMT (D-F6) Supply
F-DETACH (G-F4)
Detach percent, decon site, supplies to order

G-F4 F-DETACH

SUMMARY: This function triggers the host model routine which creates temporary units and triggers A-DETACH to fill it with a designated portion of the contaminated unit.

TRIGGERED BY:	F-PREPARE	(G-F3)		
RESULTING IN:	D-CUSTOMER	(G-E2)		
	A-DETACH	(G-A3)		
	Temporary unit created by a host model routine			

G-F5 F-DECON-ATOBJ

SUMMARY: When either the D-CUSTOMER or DECON-UNIT has arrived at its objective, this function determines what the objective is (decon site or parent unit or other) and triggers whichever is appropriate: F-DECON or A-ATTACH or none). Following A-ATTACH, the parent unit is checked and F-PREPARE is called for additional decon requirements.

TRIGGERED BY:	F-DONE-DECON	(G-F7)	Movement module	
RESULTING IN:	F-DECON	(G-F6)	F-PREPARE	(G-F3)
	F-DECON-AVAIL	(G-F2)		
	D-CUSTOMER	(G-E2)		
	A-ATTACH	(G-A4)		

G-F6 F-DECON

SUMMARY: The DECON function schedules decon, computes the delay time, calculates the amount of supplies and equipment to be used, orders replacement supplies, determines the time the decon process will be completed.

TRIGGERED BY:	F-DECON-ATOBJ	(G-A1)	F-DONE DECON	(G-F7)
	Wakeup scheduled by F-DECON (G-F6)			
RESULTING IN:	F-PREPARE	(G-F3)	F-DECON-AVAIL	(G-F2)
	F-DONE-DECON	(G-F7)	Scheduled	
	DECON-UNIT	(G-E1)		
	D-CUSTOMER	(G-E2)		
	A-BEGIN-DECON	(G-A1)		
	DECON-UNIT	(G-E1)		
	A-BEGIN-REST	(G-A5)		
	A-END-REST	(G-A6)		
	Wakeup			

G-F7 F-DONE-DECON

SUMMARY: This function determines what the DECON-UNIT does once the unit has completed a decon job (i.e., rest, begin another job, look for another D-CUSTOMER) and triggers F-DONE-CUSTOMER to check the D-CUSTOMER's next move.

TRIGGERED BY: F-DECON (G-F6)
Wakeup scheduled by F-DECON or F-DONE-DECON

RESULTING IN:

F-DECON	(G-F6)	F-DECON-AVAIL	(G-F2)
F-DECON-ATOBJ	(G-F5)	F-PREPARE	(G-F3)
F-DONE-CUSTOMER	(G-F8)	Wakeup	
DECON-UNIT	(G-E1)		
A-BEGIN REST	(G-A5)		
DECON-UNIT	(G-E1)		
D-CUSTOMER	(G-E2)		
A-END DECON	(G-A2)		

G-F8 F-DONE-CUSTOMER

SUMMARY: This function determines what the D-CUSTOMER does once the decon process has been completed.

TRIGGERED BY: F-DONE-DECON (G-F7)

RESULTING IN:

F-TRANSP-DECON	(C-F16)	Transportation
F-PREPARE	(G-F3)	
D-CUSTOMER	(G-E2)	
A-ATTACH	(G-A4)	
Movement module		

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APPENDIX G

Annex

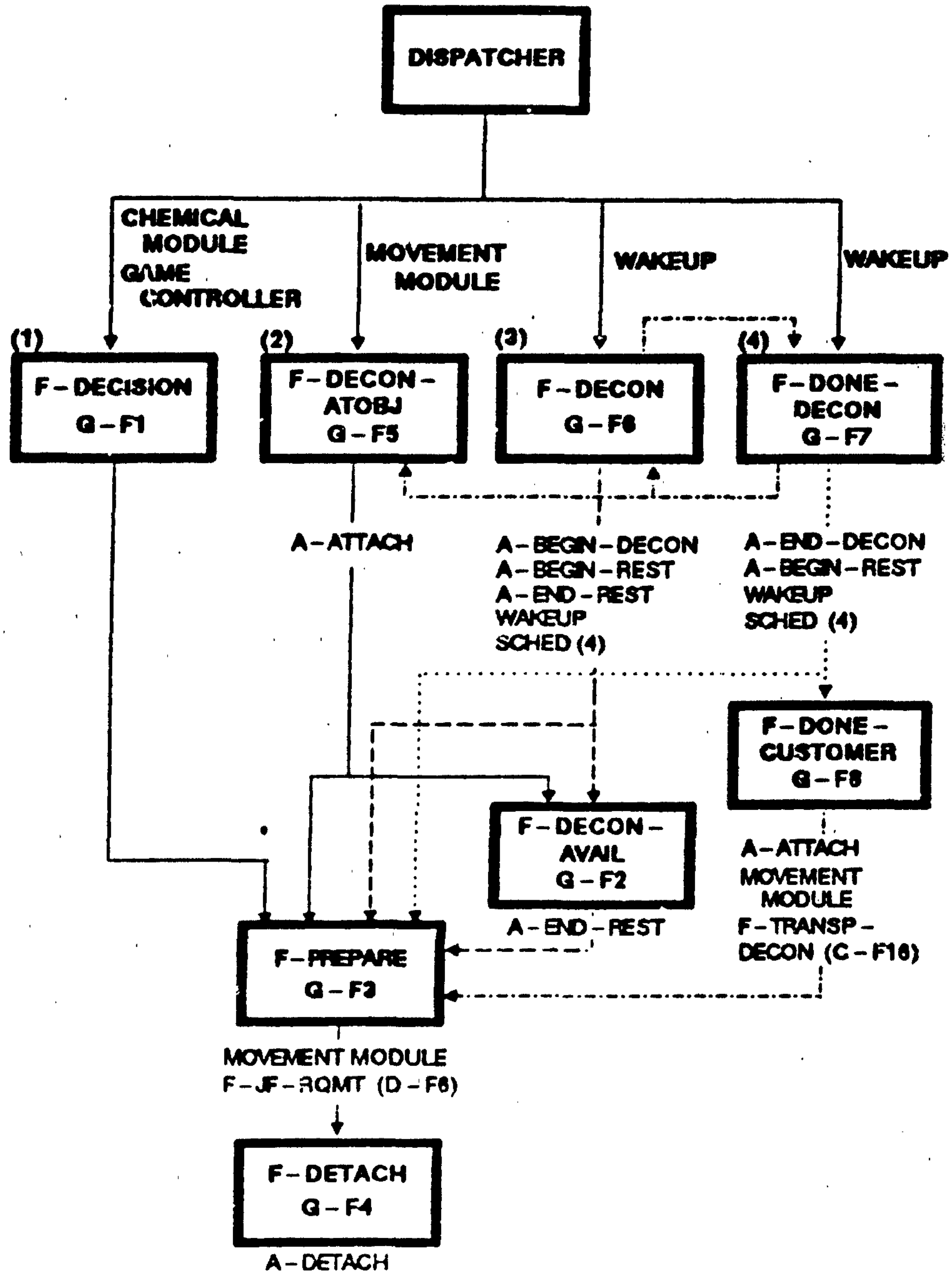

Figure G-3. Decontamination dispatcher

G-F1 F-DECISION TYPE: Interactive Function

SUMMARY: This function reads a file of decontamination (decon) requests and determines, using the F-COMMANDER, what type of decon the D-CUSTOMER should receive. The requests can come from either the chemical module, the controller, or a potential D-CUSTOMER unit. If deliberate decon is selected, F-PREPARE is called. If no DECON-UNIT is available, the request is placed in the control unit's waiting queue. If deliberate decon is not selected, the request is dropped.

TRIGGERED BY: Decon dispatcher from:
Chemical module when a unit is hit by a persistent or semipersistent hazard
Game controller when the game controller directs a unit to be decontaminated

RESULTING IN: F-PREPARE (G-F3)
(when a unit is to receive deliberate decon and needs to have a DECON-UNIT assigned)

SYSTEM SPECIFICATION DIAGRAM (SSD):

See figure G-4.

G-F1

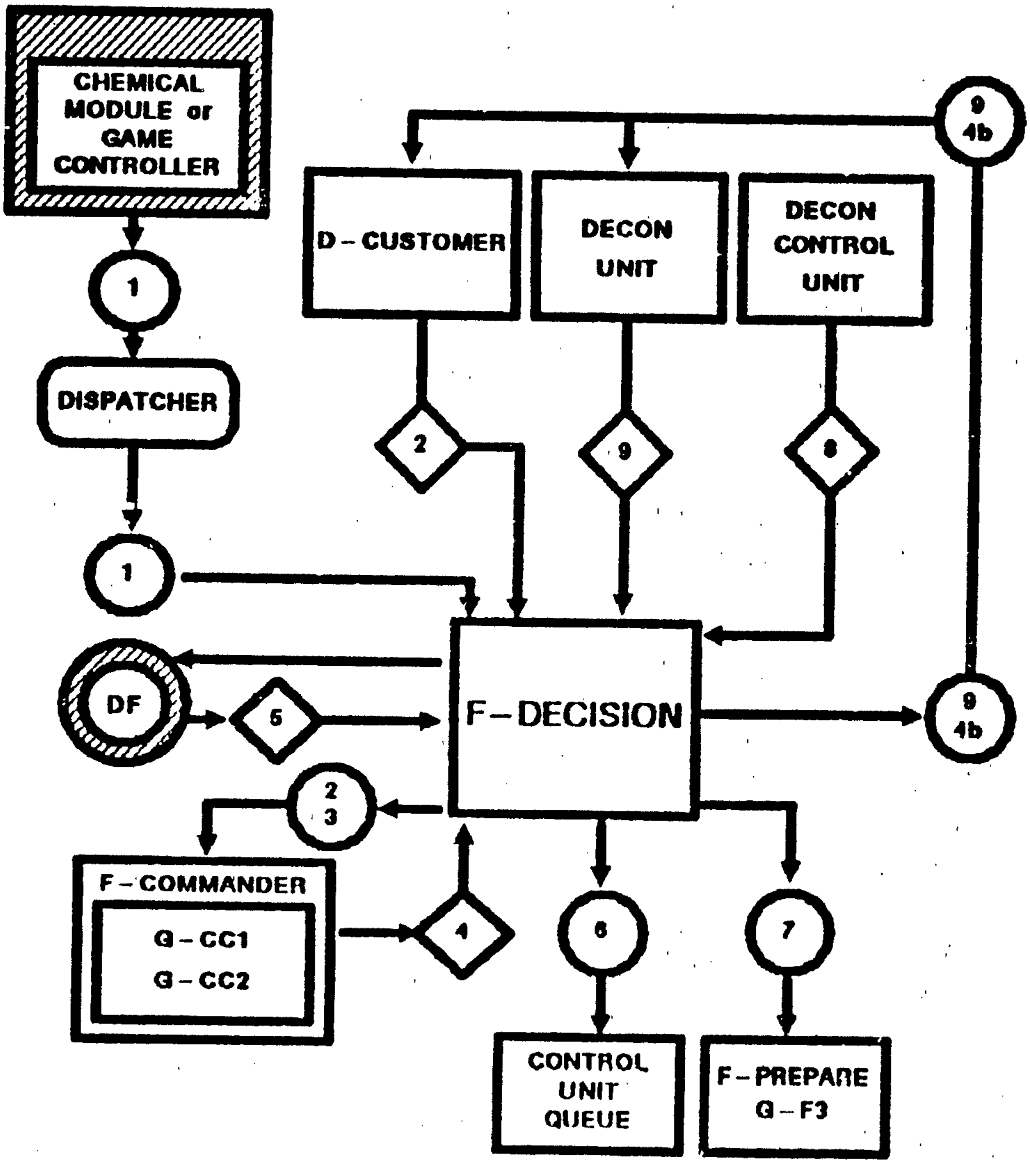

Figure G-4. F-DECISION SSD

G-F1

DATA DEFINITION: F-DECISION

Connection Number	Data Transferred	Comments
D1	o D-CUSTOMER unit ID o DECON-UNIT ID (opt.) o Decon site location (opt.)	Read to trigger function of a decon request.
S2	o D-CUSTOMER type o D-CUSTOMER opcode o MOPP level o Combat status o Time unit was contaminated o Time since last hasty decon o Type hazard	D-CUSTOMER state vector In combat/not in combat
D3a	o Hazard oo Persistent oo Semipersistent	Factors affecting the type of decon selected
D3b	o Decon control unit ID o Control unit echelon o Number of requests	Decon request assignment
D4a	o Decon type	Hasty/Deliberate/none (G-CC2)
D4b	o D-CUSTOMER decon status	Queue or forward (G-CC1)
D5	o Maximum shift time o Control unit ID	G-DF1 Locate the next control unit in the hierarchy (G-DF2).
D6	o D-CUSTOMER unit ID o Type hazard	Written to waiting queue
D7	o D-CUSTOMER unit ID o DECON-UNIT ID o Objective location	Written to F-PREPARE.
S8	o Decon control unit	
S9	o Current D-CUSTOMER ID o Standby list o Time worked this shift	DECON-UNIT state vector

G-F1

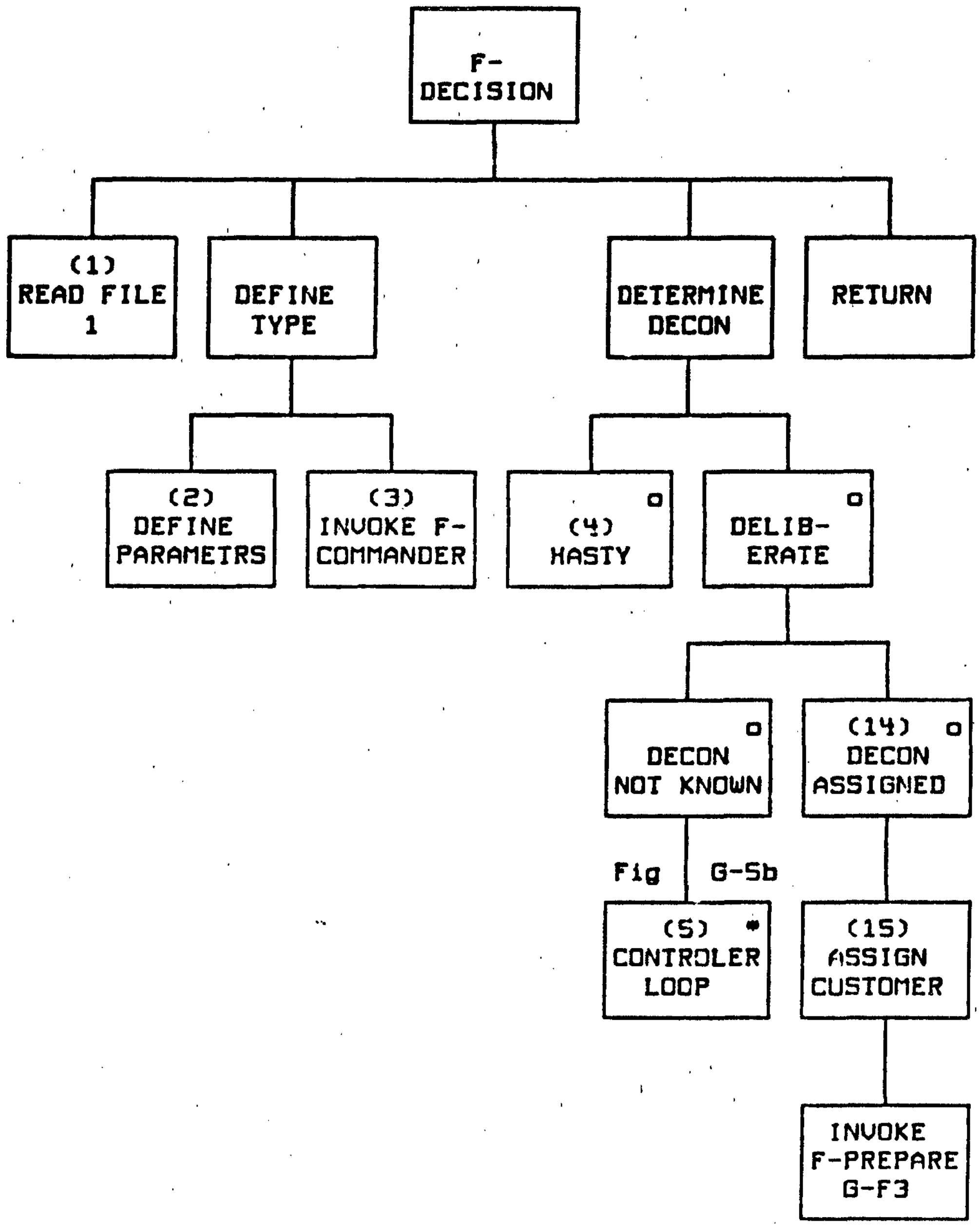

Figure G-5a. F-DECISION generator

G-F1

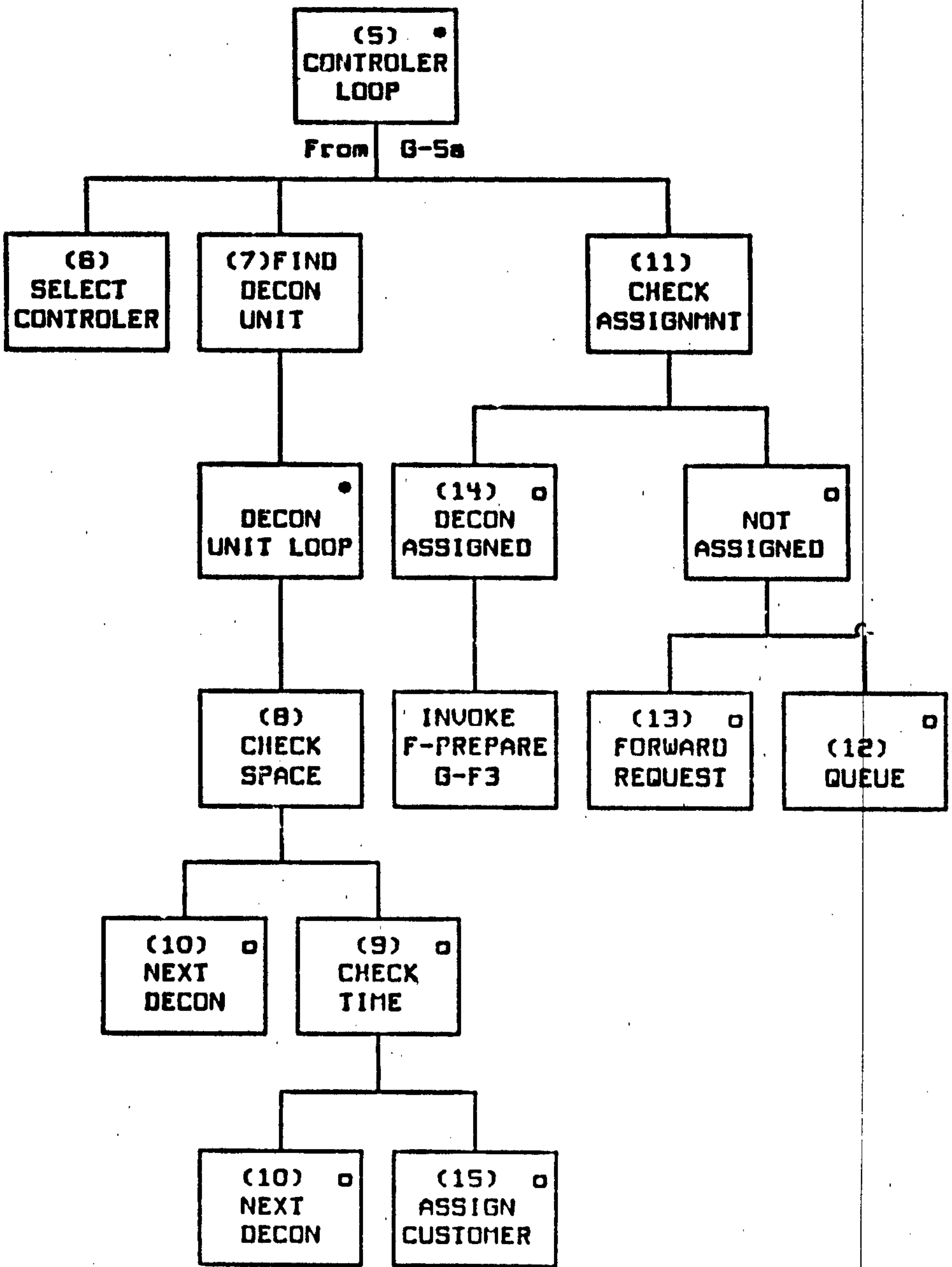

Figure G-5b. F-DECISION generator (continued)

GENERATOR DESCRIPTION: F-DECISION

1. READ FILE 1. Read D1. If the model triggers this function, only D-CUSTOMER ID will be defined. If the gamer triggers this function with a decon request, he has the option of defining a DECON-UNIT and a decon site location. All three elements are needed in D7.

2. DEFINE PARAMETERS. The following parameters (S2) are used to determine the D-CUSTOMER's decon status:

- o Unit type and opcode
- o Combat status (in ground combat, not in ground combat)

3. TRIGGER F-COMMANDER. This function is called (using the parameters in D3a) to determine whether hasty or deliberate decon will be done. The decon type (D4a) is returned.

4. HASTY. If hasty is the decon type selected, the contaminated unit (D-CUSTOMER) will perform its own hasty decon, implicitly. The decon module takes no action but to return to the calling routine.

5. CONTROLLER LOOP. Each controller unit in the contaminated unit's decon reporting hierarchy is checked for availability. The decon request will either be filled or put on a controller queue.

6. DETERMINE CONTROLLER. The contaminated unit's state vector (S2) is checked to determine the decon control unit supporting it. If its assigned decon control unit is full, then the control unit's own controller will be examined (S8). This search is repeated until an available controller is located.

7. LOCATE DECON-UNIT. Each DECON-UNIT reporting to the decon controller is checked for availability.

8. CHECK SPACE. The availability of the DECON-UNIT to begin work immediately (S7) is checked. A DECON-UNIT can be working on a D-CUSTOMER and/or have a standby D-CUSTOMER in the queue. If a DECON-UNIT has two D-CUSTOMERs (one current and one standby), it cannot accept another. If no D-CUSTOMER is on standby, or if none is currently being deconned, the DECON-UNIT is able to receive another D-CUSTOMER.

9. CHECK WORK TIME. A DECON-UNIT can only perform decon a certain length of time without rest. Before pairing up a D-CUSTOMER and a DECON-UNIT, the time the DECON-UNIT has worked in its shift is determined (S9). If the time worked is greater than or equal to the maximum shift time (S5), or if it is currently "at rest," the DECON-UNIT will not be available until the end of its scheduled rest period.

F-DECISION (cont.)

10. NEXT DECON. If the DECON-UNIT is not available, the next DECON-UNIT is checked.

11. DETERMINE ASSIGNMENT. If no DECON-UNIT under the controller is immediately available, F-COMMANDER is triggered using parameters in D3b to determine what to do with the request. The request can either remain assigned to this controller and be put in a queue or it can be forwarded to the next controller (D4b).

12. QUEUE. If the decision is to have the request remain with the current control unit, the request is added to the request queue. A first-in, first-out (FIFO) priority system is used.

13. FORWARD REQUEST. If the decision is to forward the request, D5b is checked to determine the next control unit in the hierarchy. The new control unit is processed starting at step 5.

14. DECON ASSIGNED. When the DECON-UNIT is assigned by the gamer, no search is necessary.

15. ASSIGN D-CUSTOMER. If a DECON-UNIT is available, the D-CUSTOMER ID is added to the DECON-UNIT's D-CUSTOMER list and F-PREPARE is triggered using parameters in D7.

G-F2   F-DECON-AVAIL   TYPE: Interactive Function

SUMMARY: This function checks the DECON-UNIT's control unit queue for work to be done. It removes a decon request from the queue and checks to see if the designated unit still needs decontamination. If not, the request is discarded and another removed from the queue. If it does, the designated unit is added to the DECON-UNIT's standby list as either the current or next D-CUSTOMER. This process simulates the chemical officer being informed that the DECON-UNIT is ready for another mission and the assignment of the mission.

TRIGGERED BY:	F-DECON-ATOBJ	(G-F5)
	F-DECON	(G-F6)
	F-DONE-DECON	(G-F6)
RESULTING IN:	F-PREPARE	(G-F3)
	DECON-UNIT	(G-E1)
	A-END-REST	(G-A6)

SYSTEM SPECIFICATION DIAGRAM:

See figure G-6.

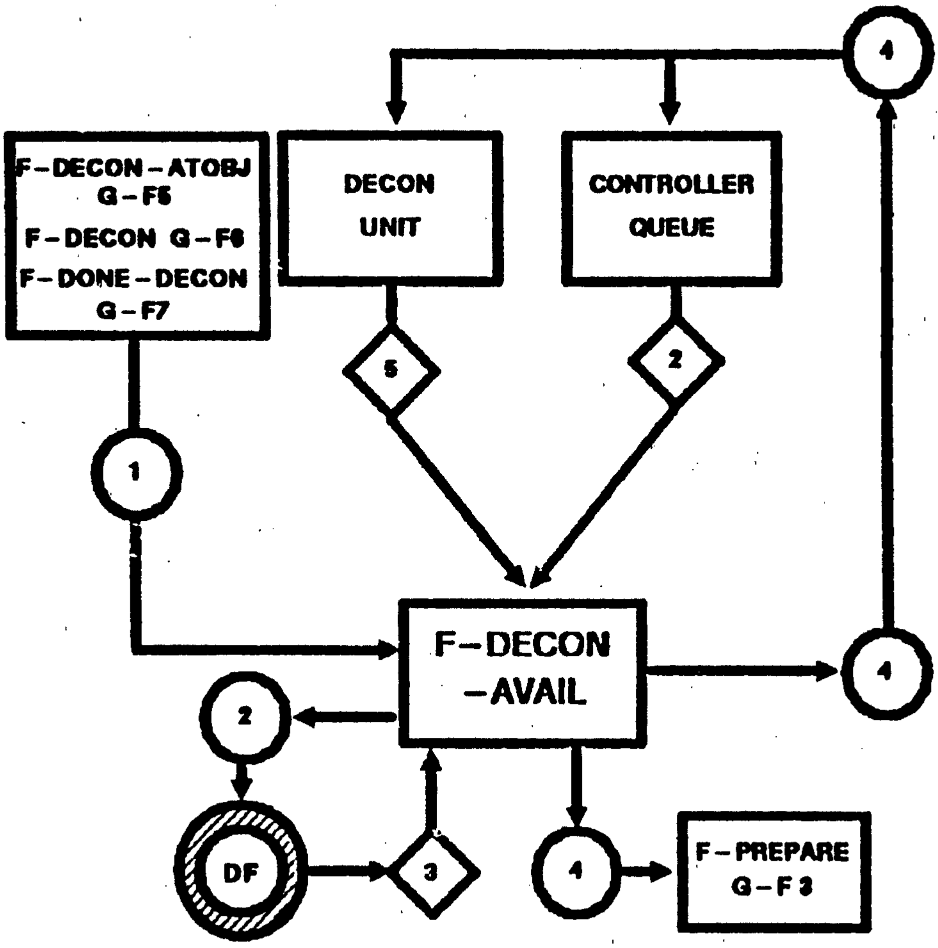

Figure G-6. F-DECON-AVAIL SSD

DATA DEFINITION: F-DECON-AVAIL

Connection Number	Data Transferred	Comments
D1	o DECON-UNIT ID	Read to trigger function of work request.
	o D-CUSTOMER type	Current or standby
S2	o Controller queue o D-CUSTOMER ID o Hazard type o Time unit was contaminated	Locate customer unit and identify hazard needs.
D3	o Hazard type o Hazard lifetime	Read to find out expiration time of hazard (G-DF3).
D4	o D-CUSTOMER ID o DECON-UNIT ID	Written to F-PREPARE.
S5	o DECON-UNIT status	DECON-UNIT data required

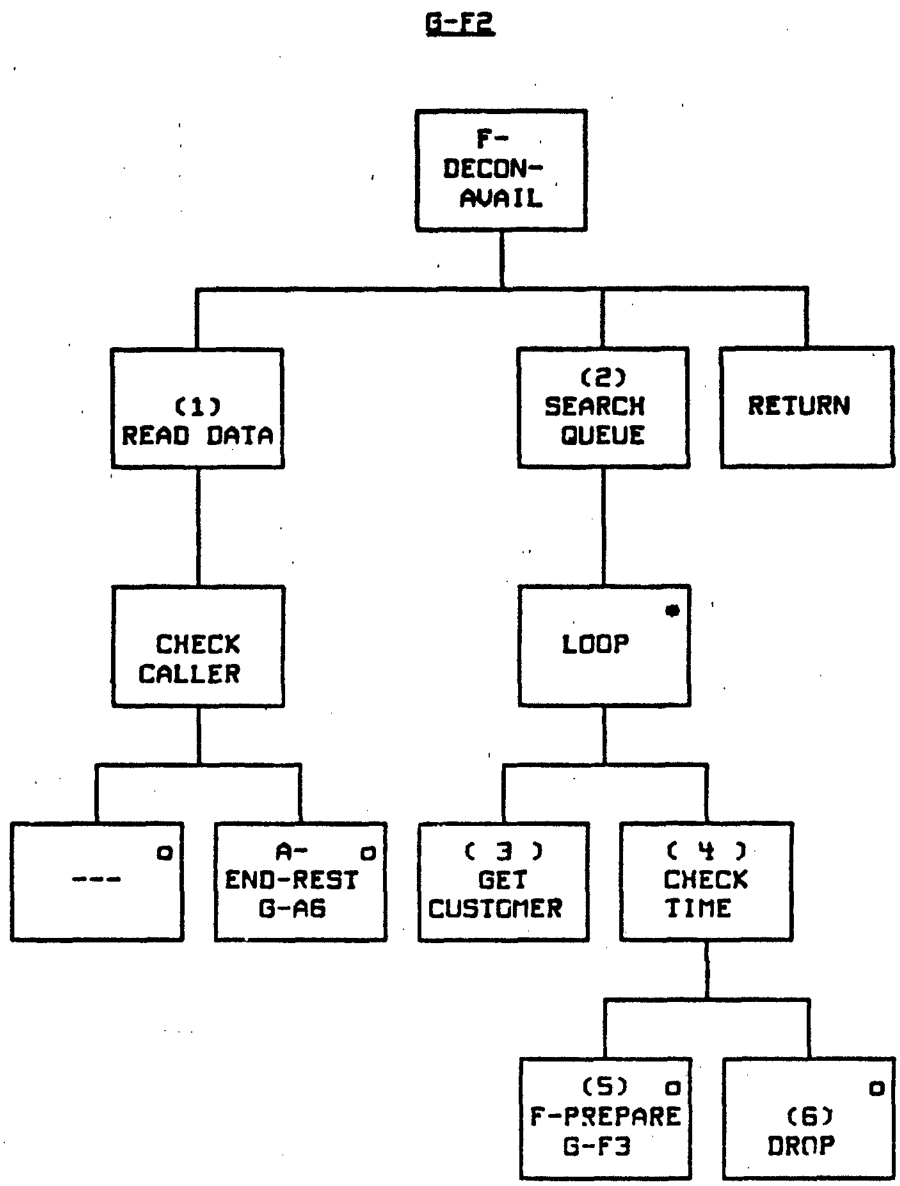

Figure G-7. F-DECON-AVAIL generator

G-F2

GENERATOR DESCRIPTION: F-DECON-AVAIL

1. READ FILE 1. D1 identifies a DECON-UNIT available for work or with room on its standby list. The DECON-UNIT status is checked and if it is currently "at rest," an END-REST action is triggered.

2. SEARCH QUEUE. The DECON-UNIT's control unit queue is searched until a D-CUSTOMER is found.

3. GET D-CUSTOMER. The first D-CUSTOMER (i.e., request) is removed from the waiting queue (S2).

4. CHECK TIME. The hazard's expiration time is checked by retrieving the hazard's type and its expiration time from the contamination table (S3) and by calculating the length of time since the D-CUSTOMER was contaminated (i.e., subtract the time the D-CUSTOMER was contaminated from the current time). This time is compared to the expiration time of the hazard found in D3.

5. ASSIGN. If the D-CUSTOMER's contamination time length is less than or equal to the hazard's expiration time length, the D-CUSTOMER is placed on the DECON-UNIT's list and the D-CUSTOMER unit ID and DECON-UNIT ID are sent to F-PREPARE (D4).

6. DROP REQUEST. If the D-CUSTOMER's contamination time is greater than the hazard's expiration time, drop the decon request; no action is taken.

G-F3 F-PREPARE TYPE: Interactive Function

SUMMARY: This function obtains a DECON-UNIT and contaminated unit pair from F-DECISION or F-DECON AVAILABLE and, using F-COMMANDER, determines the percentage of the unit to be detached for decontamination; where the decon process will take place; and what supplies/equipment will be needed. It then issues the orders for supplies/equipment, unit detachment, and movement.

TRIGGERED BY:

F-DECISION	(G-F1)
F-DECON	(G-F6)
F-DECON-AVAIL	(G-F2)
F-DONE-DECON	(G-F7)
F-DECON ATOBJ	(G-F5)
F-DONE-CUSTOMER	(G-F8)

RESULTING IN:

Detach percentage		F-COMMANDER
Supply/equipment amounts		F-COMMANDER
Objective location		F-COMMANDER
F-DETACH	(G-F4)	
F-JF-RQMT	(D-F6)	Supply
Movement module		

SYSTEM SPECIFICATION DIAGRAM:

See figure G-8.

G-F3

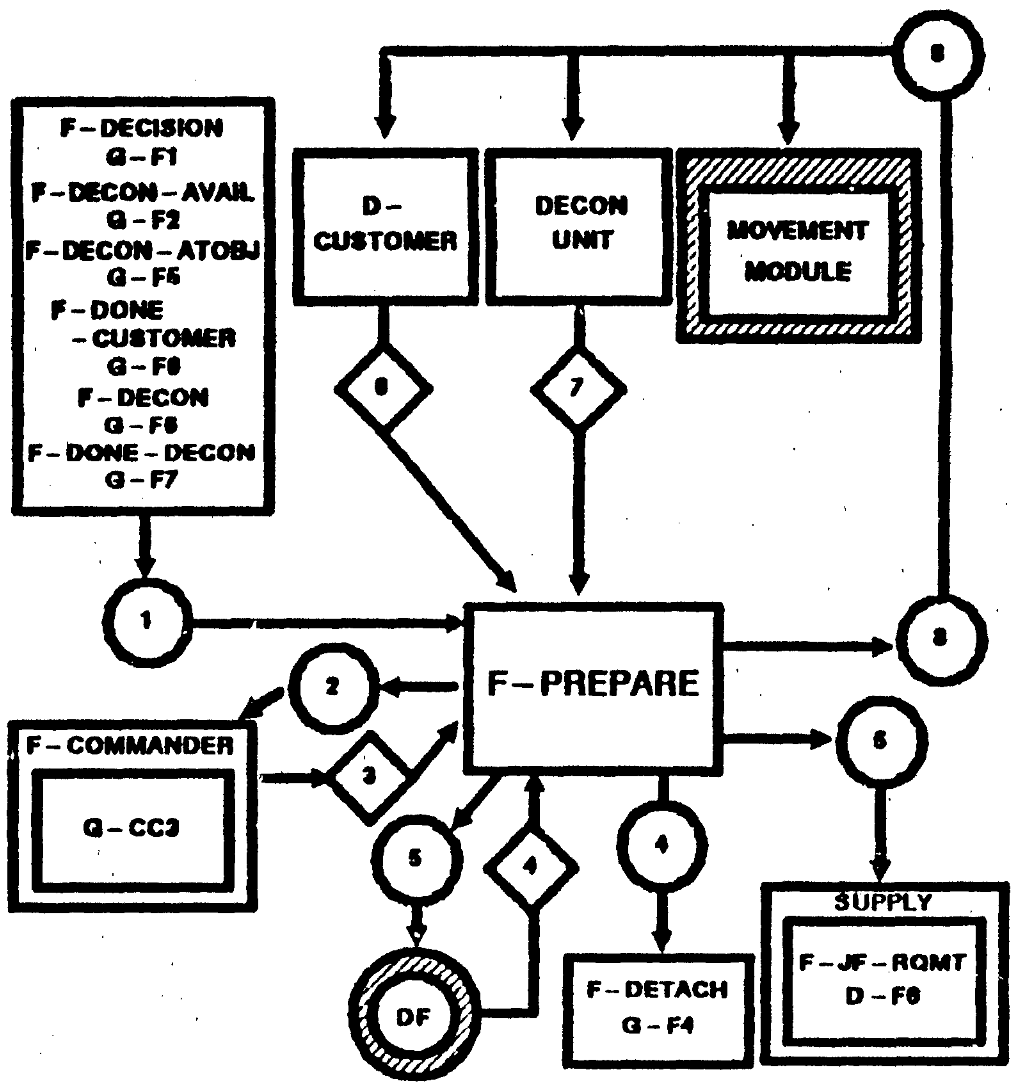

Figure G-8. F-PREPARE SSD

G-F3

DATA DEFINITION: F-PREPARE

Connection Number	Data Transferred	Comments
D1	o D-CUSTOMER unit ID o DECON-UNIT ID o Objective location decon site	Read to trigger function.
D2	o D-CUSTOMER unit ID o Combat status o DECON-UNIT ID o DECON-UNIT location: oo At decon site oo Not at decon site	Information used to determine movement.
D3	o Decon/customer movement table (G-CC4)	Select: D-CUSTOMER moves to decon site; DECON-UNIT moves to D-CUSTOMER; both move.
D4	o Parent unit ID o Percent detached o New D-CUSTOMER unit ID	See DETACHMENT PERCENTAGE (G-DF4)
D5	o Supply type(s) o Quantity	Types of supplies/ equipment and amounts required of each.
S6	o Movement flag o Unit status o Equipment/supply inventory o Unit location o Unit ID o Hazard type o Time of contamination	D-CUSTOMER state vector
S7	o Movement flag o Unit ID o Equipment/supply inventory o combat status o location	DECON-UNIT state vector
D8	o Moving unit IDs o Objective location	Used to determine unit's location.

G-F3

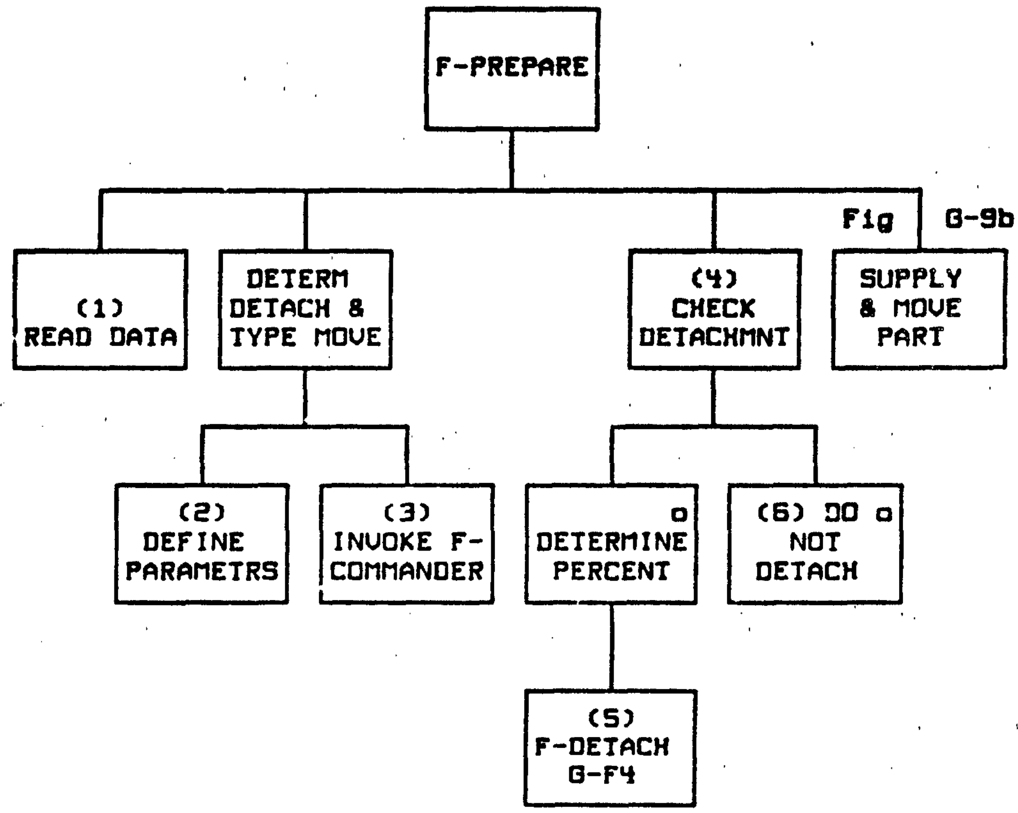

Figure G-9a. F-PREPARE generator

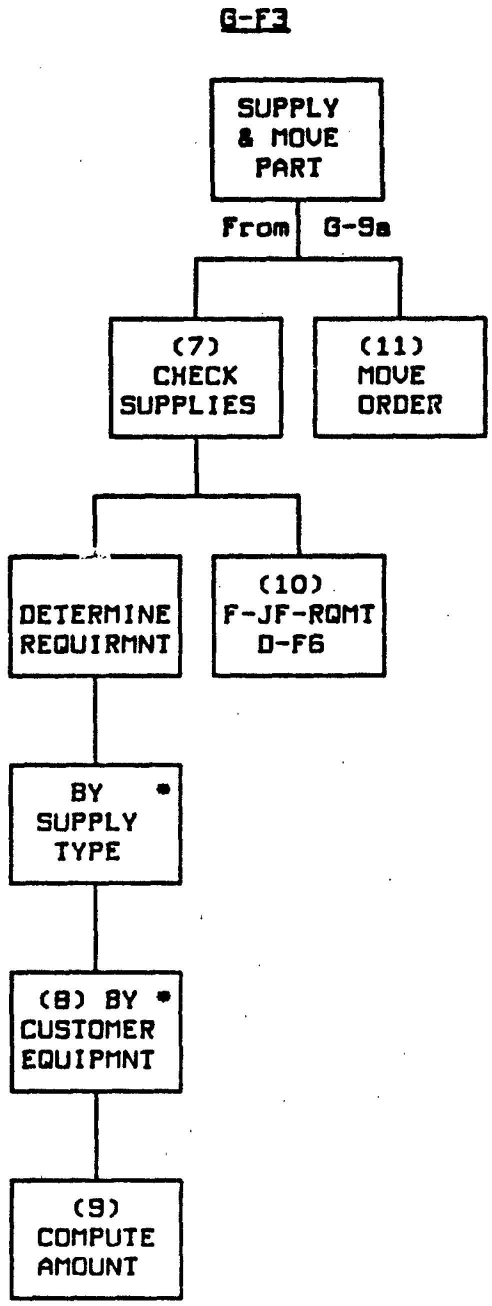

Figure G-9b. F-PREPARE generator (continued)

GENERATOR DESCRIPTION: F-PREPARE

1. READ FILE 1. D1 is read.

2. DEFINE PARAMETERS. The D-CUSTOMER status (whole/detached) and the movement type are determined by considering the following parameters from D2 and S6:

- o D-CUSTOMER ID, type, opcode, status, location
- o DECON-UNIT ID, status, location
- o Hazard type, time of contamination

3. TRIGGER F-COMMANDER. F-COMMANDER is triggered first to determine whether to detach or not and then to determine which movement action to use (D3):

- o D-CUSTOMER moves to decon site
- o D-CUSTOMER and DECON-UNIT move to decon site
- o DECON-UNIT moves to the D-CUSTOMER

4. CHECK DETACHMENT. If a D-CUSTOMER is to be detached, D4 is checked to determine the percentage.

5. TRIGGER F-DETACH. F-DETACH is triggered using D8:

- o D-CUSTOMER unit ID
- o Detach percent (%)

6. DON'T DETACH. The D-CUSTOMER will get deconned as a whole.

7. CHECK SUPPLIES. Check amount of every supply type needed for each D-CUSTOMER.

8. D-CUSTOMER EQUIPMENT. Check amount needed for each D-CUSTOMER equipment type (including personnel).

9. COMPUTE AMOUNT NEEDED. The total amount of decon supplies needed is accumulated. The amount of decon supplies needed is a function of D-CUSTOMER equipment type (S9) and decon supply type.

```
TOTAL AMOUNT SUPPLIES = TOTAL PREVIOUS AMOUNT SUPPLIES
                        + AMOUNT OF THE SUPPLY TYPE/EQUIPMENT TYPE
                        + [AMOUNT OF THIS EQUIPMENT TYPE IN THE UNIT
                        X DETACHED PERCENTAGE (%)]
```

F-PREPARE (cont.)

10. TRIGGER SUPPLY ORDER. This is a job refill action to order supplies. All the supplies that are needed are ordered even though the DECON-UNIT has enough supplies on hand to decontaminate a maneuver-size brigade. While the DECON-UNIT and D-CUSTOMER are waiting for the supplies to arrive, the DECON-UNIT can start performing the decon process with the on-hand amount and finish when the other supplies arrive. This will allow the unit to maintain the on-hand supplies at the threshold level. F-JF-RQST (D-F6) is triggered using D5.

G-F4 **F-DETACH** TYPE: Interactive Function

SUMMARY: This function is triggered by F-PREPARE when the D-CUSTOMER requires detachment. It triggers a host model routine to create a temporary unit and calls A-DETACH to fill it from the contaminated unit.

TRIGGERED BY: F-PREPARE (G-F3)

RESULTING IN: D-CUSTOMER (G-E2)
A-DETACH (G-A3)
Temporary unit created by a host model routine

SYSTEM SPECIFICATION DIAGRAM:

See figure G-10.

G-F4

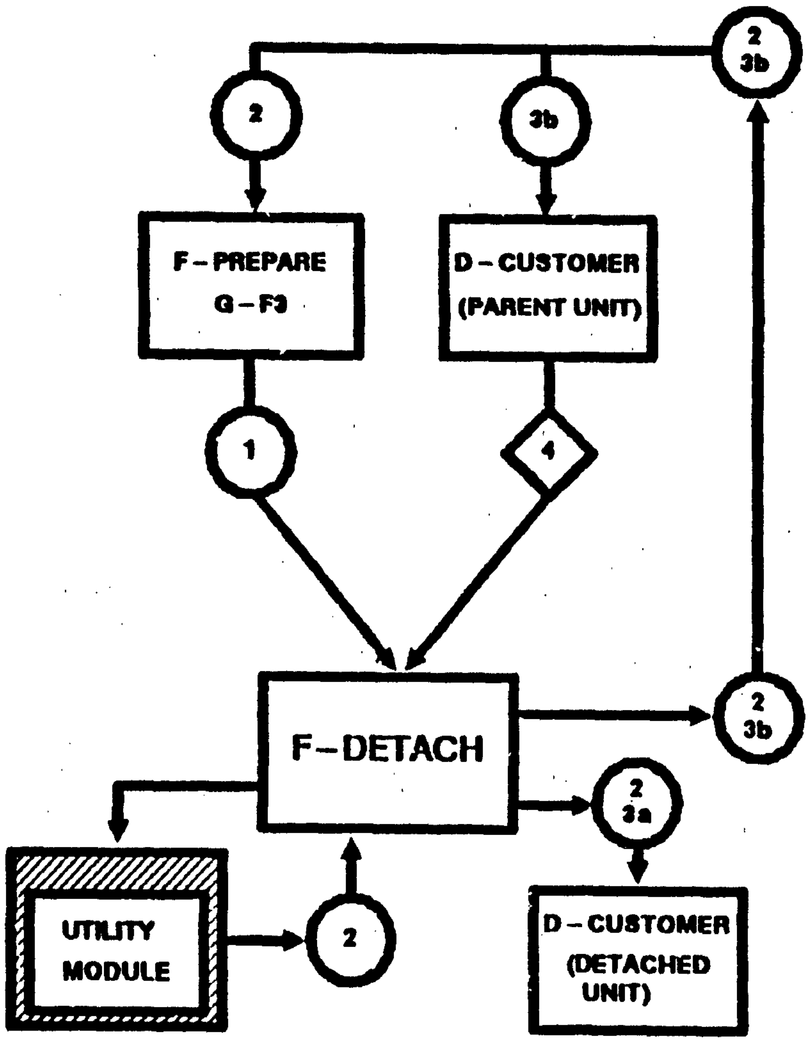

Figure G-10. F-DETACH SSD

DATA DEFINITION: F-DETACH

Connection Number	Data Transferred	Comments
D1	o D-CUSTOMER unit ID o Detach percent of unit	Parameters from F-PREPARE.
D2	o Detached unit ID	Returned to F-PREPARE.
D3a	o Supplies assigned o Equipment assigned o Personnel assigned	Amounts to create a new unit by subtracting from the parent unit.
D3b	o New supply inventory o New equipment inventory o New personnel inventory	
S4	o D-CUSTOMER unit ID o Supply inventory o Equipment inventory o Personnel inventory	Parent unit state vector.

G-F4

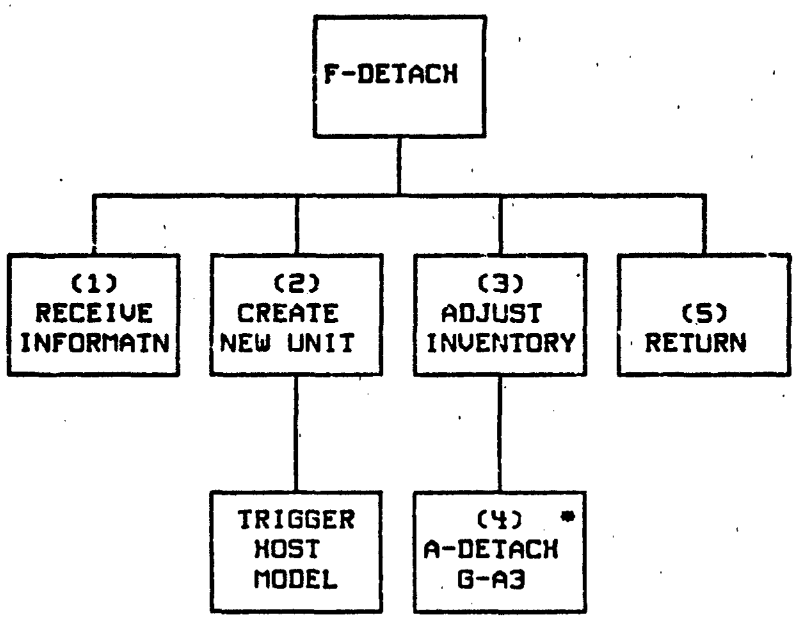

Figure G-11. F-DETACH generator

GENERATOR DESCRIPTION: F-DETACH

1. READ FILE 1. The input parameters are read (D1).

2. CREATE NEW UNIT. The host model routine that creates a temporary unit is triggered. A temporary unit is created to become the new D-CUSTOMER. The contaminated unit becomes the parent unit.

3. ADJUST INVENTORIES. The quantity of each system type in the parent unit is determined. The system types include all the different equipment types and personnel in the unit.

4. TRIGGER A-DETACH.. A-DETACH is called using D1. The detach percentage (%) of the unit (D1) is multiplied by the total quantity of each system type (S4). The formula for each system:

TOTAL QUANTITY FOR ONE SYSTEM X DETACH %
= QUANTITY DETACHED FOR ONE SYSTEM

The resulting quantities are transferred from the parent unit to the new D-CUSTOMER (D3).

5. RETURN. The new D-CUSTOMER ID is returned to F-PREPARE (D2).

G-F5 F-DECON-ATOBJ TYPE: Interactive Function

SUMMARY: When either the DECON-UNIT or D-CUSTOMER has arrived, this function determines the next step or action to take place. If a DECON-UNIT has arrived, F-DECON or F-DECON-AVAIL is triggered. If a D-CUSTOMER has arrived, either F-DECON or A-ATTACH can be called, depending upon the unit's status. If A-ATTACH is triggered, the parent unit's MOPP level is checked and, if additional decontamination is needed, F-PREPARE is triggered.

TRIGGERED BY:	Movement module	
	F-DONE-DECON	(G-F7)
RESULTING IN:	D-CUSTOMER	(G-E2)
	A-ATTACH	(G-A4)
	F-DECON	(G-F6)
	F-PREPARE	(G-F3)
	F-DECON-AVAIL	(G-F2)

SYSTEM SPECIFICATION DIAGRAM:

See figure G-12.

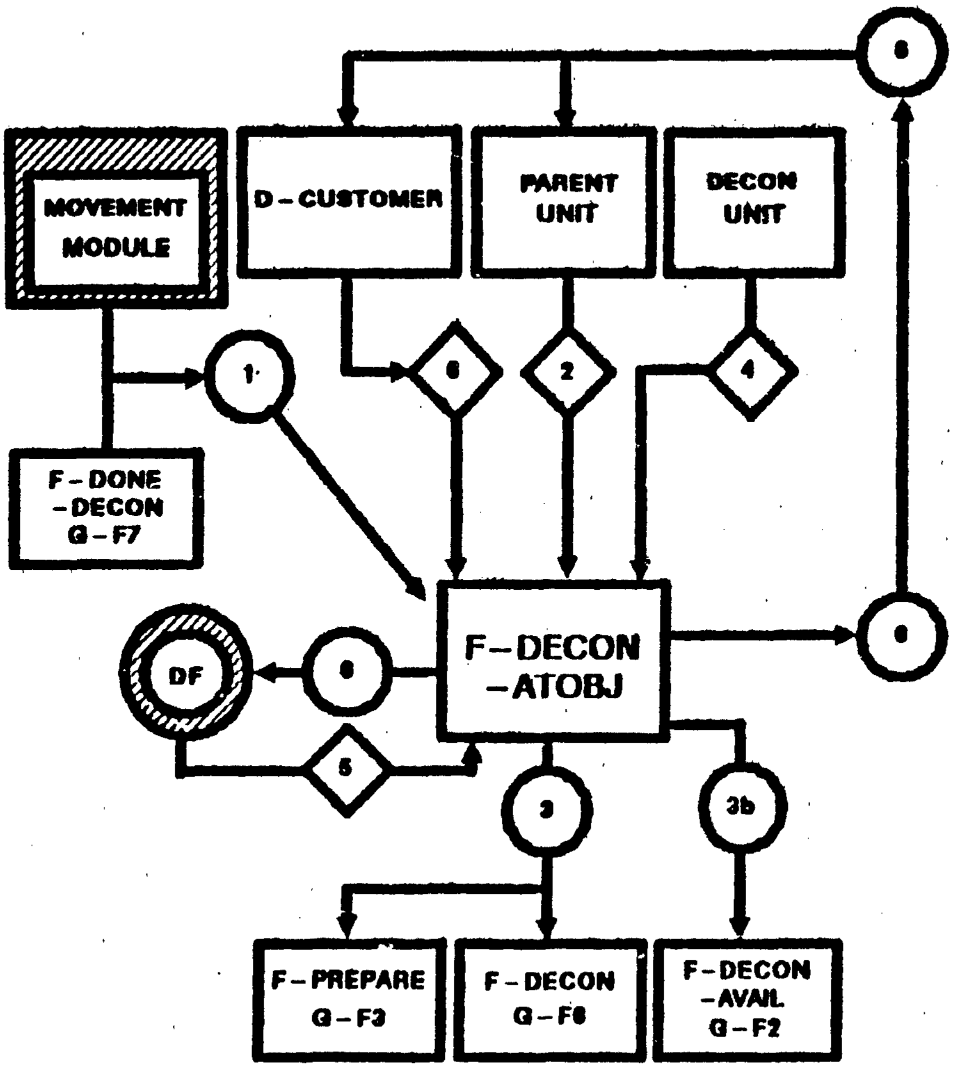

Figure G-12. F-DECON-ATOBJ SSD

G-F5

DATA DEFINITION: F-DECON-ATOBJ

Connection Number	Data Transferred	Comments
D1	o Unit ID	The ID of the D-CUSTOMER/DECON-UNIT that has just arrived at its objective.
S2	o Parent unit ID o Parent MOP? level o D-CUSTOMER ID o Parent location	The parent unit state vector.
D3a	o D-CUSTOMER unit ID o Setup delay time	Required for F-DECON.
D3b	o DECON-UNIT ID	
S4	o DECON-UNIT status o Standby list	DECON-UNIT state vector Checked to see whether it is ready to move, to decon, or to rest.
D5	o Setup time	The time it will take the DECON-UNIT to set up based on D-CUSTOMER unit type and status and on current suppression level (G-DF6).
S6	o D-CUSTOMER unit status o D-CUSTOMER unit location	D-CUSTOMER state vector

G-F5

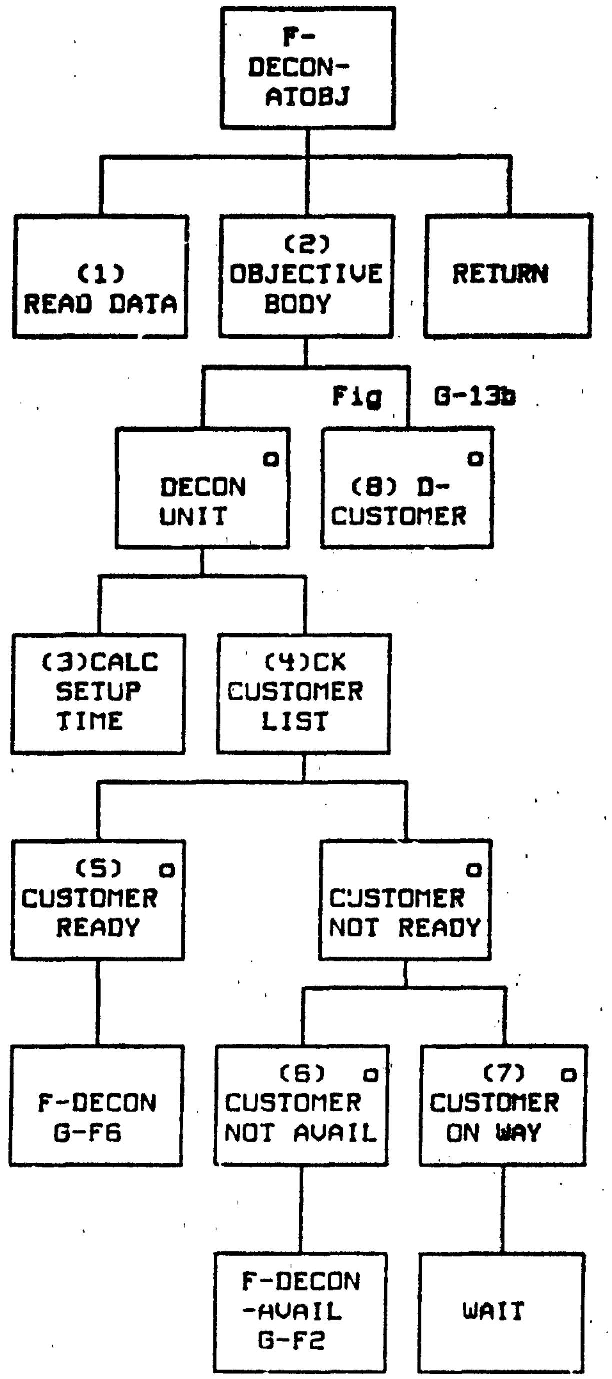

Figure G-13a. F-DECON-ATOBJ generator

G-F5

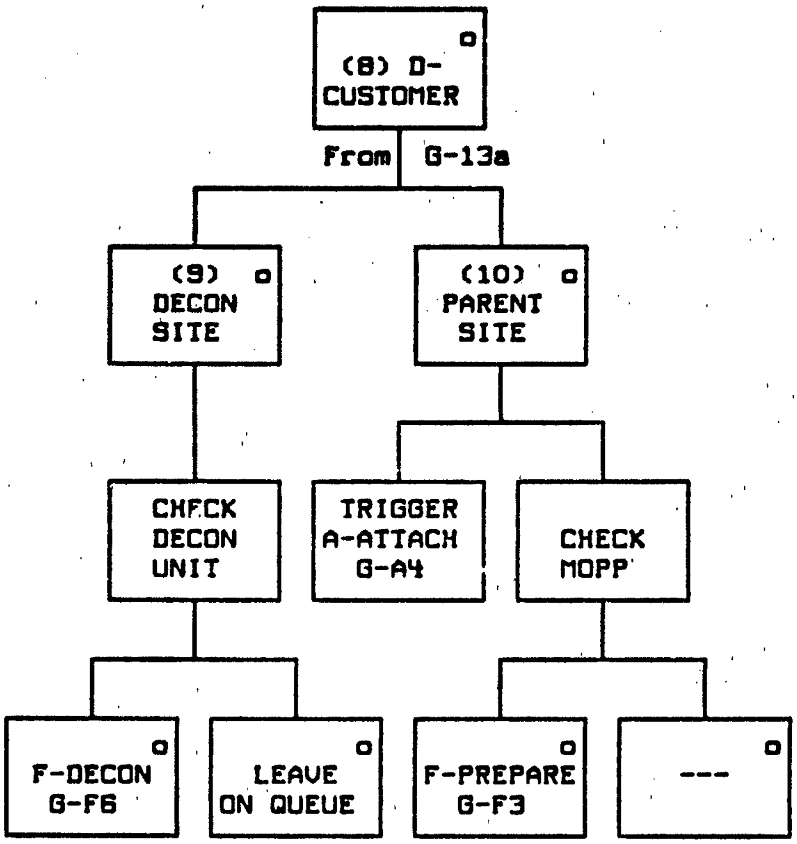

Figure G-13b. F-DECON-ATOBJ generator (continued)

GENERATOR DESCRIPTION: F-DECON-ATOBJ

1. READ DATA FILE. D1 is read to trigger function.

2. OBJECTIVE BODY. If D1 indicates that a D-CUSTOMER has arrived, then the D-CUSTOMER status is checked to determine if it is to be reattached to its parent or prepared for decon. If the arriving unit is a DECON-UNIT, the decon site must be prepared.

3. DETERMINE SETUP TIME. The setup time for a DECON-UNIT to prepare a new decon site is obtained from D5. If the DECON-UNIT is already at a site, the setup time is 0.

4. CHECK LIST. The DECON-UNIT's standby list is checked to see if a D-CUSTOMER is ready for decontamination. Such a D-CUSTOMER must be at its objective (i.e., at the decon site/same location as the DECON-UNIT).

5. D-CUSTOMER READY. If a D-CUSTOMER is ready, an F-DECON event is scheduled using D3 and the delay time obtained in step 3.

6. D-CUSTOMER NOT AVAILABLE. If no D-CUSTOMER is ready, a check is made to determine why. If no D-CUSTOMER unit is currently assigned, F-DECON-AVAIL is triggered to locate one.

7. D-CUSTOMER ON WAY. If a D-CUSTOMER is on the DECON-UNIT's standby list, but is not yet at the decon site, the DECON-UNIT waits.

8. D-CUSTOMER ARRIVES. The location is checked to determine the next step to take (S6).

9. DECON SITE. If the DECON-UNIT is available, the F-DECON function is called using D3.. If a DECON-UNIT is not immediately available, the D-CUSTOMER is left on the standby queue.

10. PARENT SITE. If the D-CUSTOMER has returned to its parent unit location (objective) then A-ATTACH is triggered using S2. The parent unit's MOPP is checked to determine if the it requires additional decontamination. If so, F-PREPARE is called to continue the decon process on the unit.

G-F6 F-DECON TYPE: Interactive Function

SUMMARY: This function calculates the amount of time and the amount of supplies needed for the decon process and determines the amount of supplies available. If sufficient shift time and supplies are available, it schedules F-DONE-DECON, triggers A-BEGIN-DECON, and checks its standby D-CUSTOMER list. If the standby list is filled but the standby D-CUSTOMER is not at the decon site, F-PREPARE is triggered; if the standby list is not full, F-DECON-AVAIL is triggered to locate a new D-CUSTOMER. If there is not sufficient time or supplies to complete the decon during the current shift, then a wakeup is scheduled and A-BEGIN REST is triggered.

TRIGGERED BY: F-DECON-ATOBJ (G-F5)
Wakeup scheduled by F-DECON (G-F6)
Scheduled by F-DONE-DECON (G-F7)

RESULTING IN:	DECON-UNIT	(G-E1)	
	A-BEGIN-DECON	(G-A1)	
	A-BEGIN-REST	(G-A5)	
	A-END-REST	(G-A6)	
	F-DONE-DECON	(G-F5)	Scheduled
	F-DECON-AVAIL	(G-F2)	
	F-PREPARE	(G-F3)	
	Scheduled wakeup		

SYSTEM SPECIFICATION DIAGRAM:

See figure G-14.

G-F6

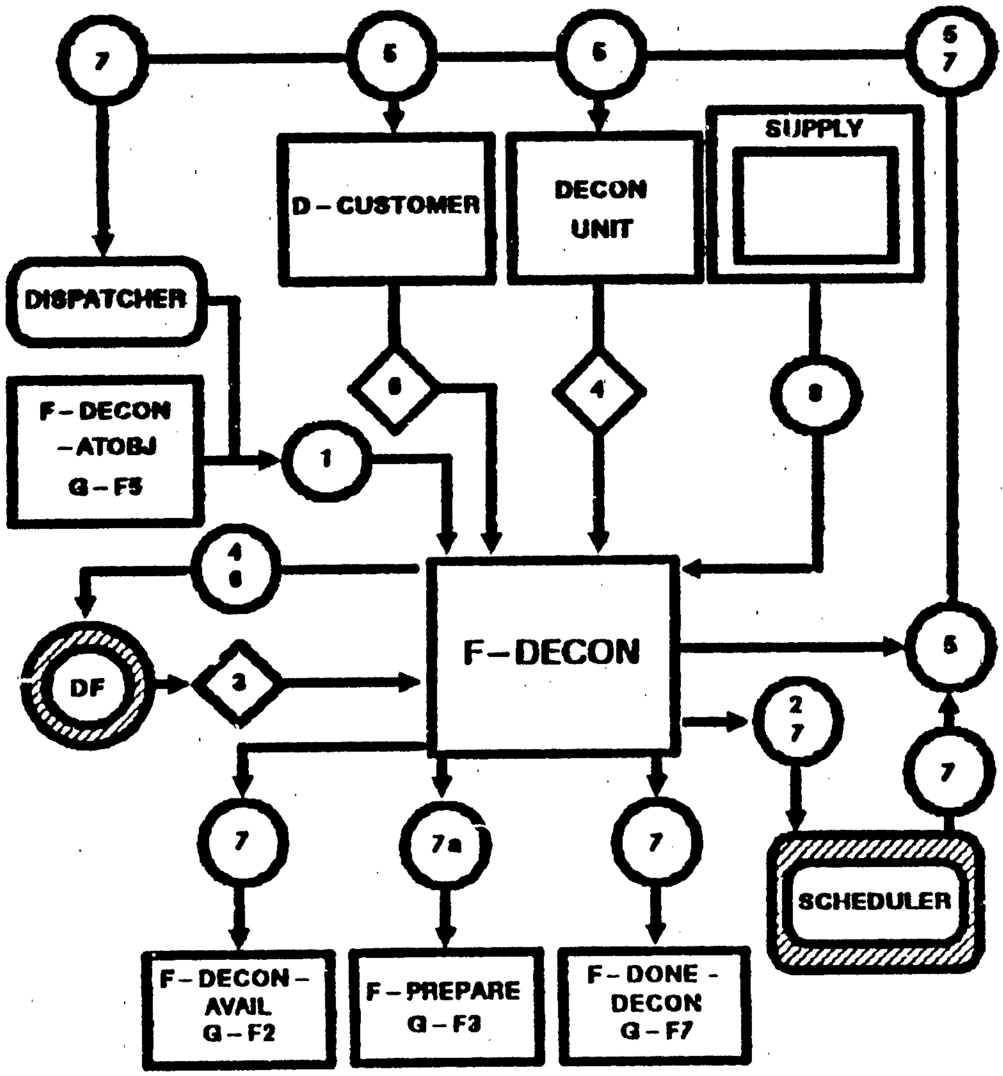

Figure G-14. F-DECON SSD

DATA DEFINITION: F-DECON

Connection Number	Data Transferred	Comments
D1	o D-CUSTOMER unit ID o DECON-UNIT ID o Setup time o Job status	Passed by calling routine. New/continuation
D2	o D-CUSTOMER unit ID o DECON-UNIT ID o Delay time o Resulting function ID o Wakeup time	Written to scheduler.
D3a	o Supplies required	Quantity of decontaminants needed (G-DF5).
	o Time required	Length of time needed to decon a specified number of vehicles (G-DF7).
D3b	o Work time	Maximum time to work in one shift (G-DF1).
S4	o DECON-UNIT ID o Location of unit o Suppression level o Start time of this shift o Accumulated time on this job o Amount of time worked this shift o Decontaminants on hand	DECON-UNIT state vector.
D5	o Start time of decon job o D-CUSTOMER unit ID	Identify the decon job.
S6	o Unit ID o Unit status flag o Suppression level o Supplies/equipment to use o Supplies/equipment to be deconned	D-CUSTOMER state vector.
D7	o DECON-UNIT ID	F-DECON-AVAIL
D8	o Supply replacements	From the supply module.

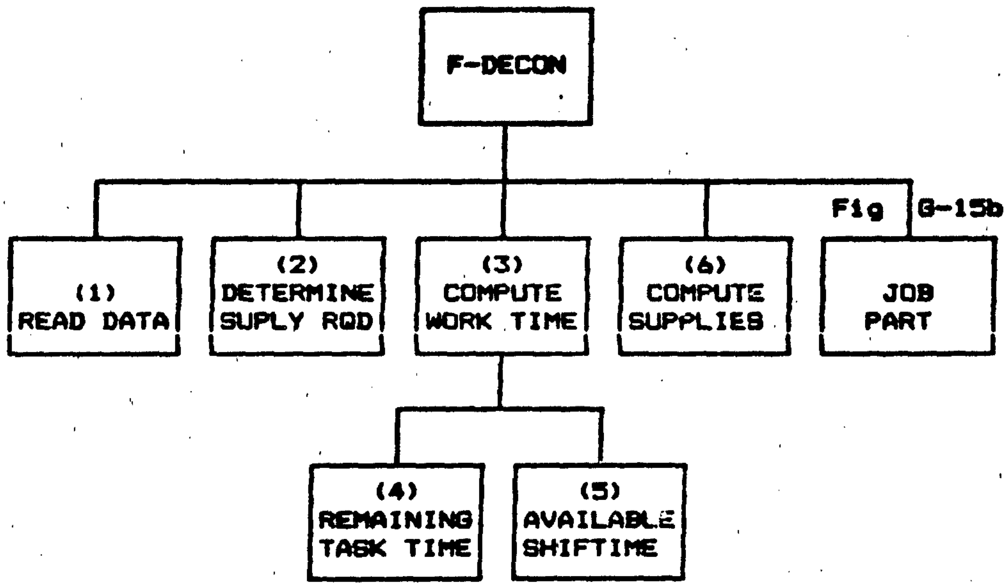

Figure G-15a. F-DECON generator

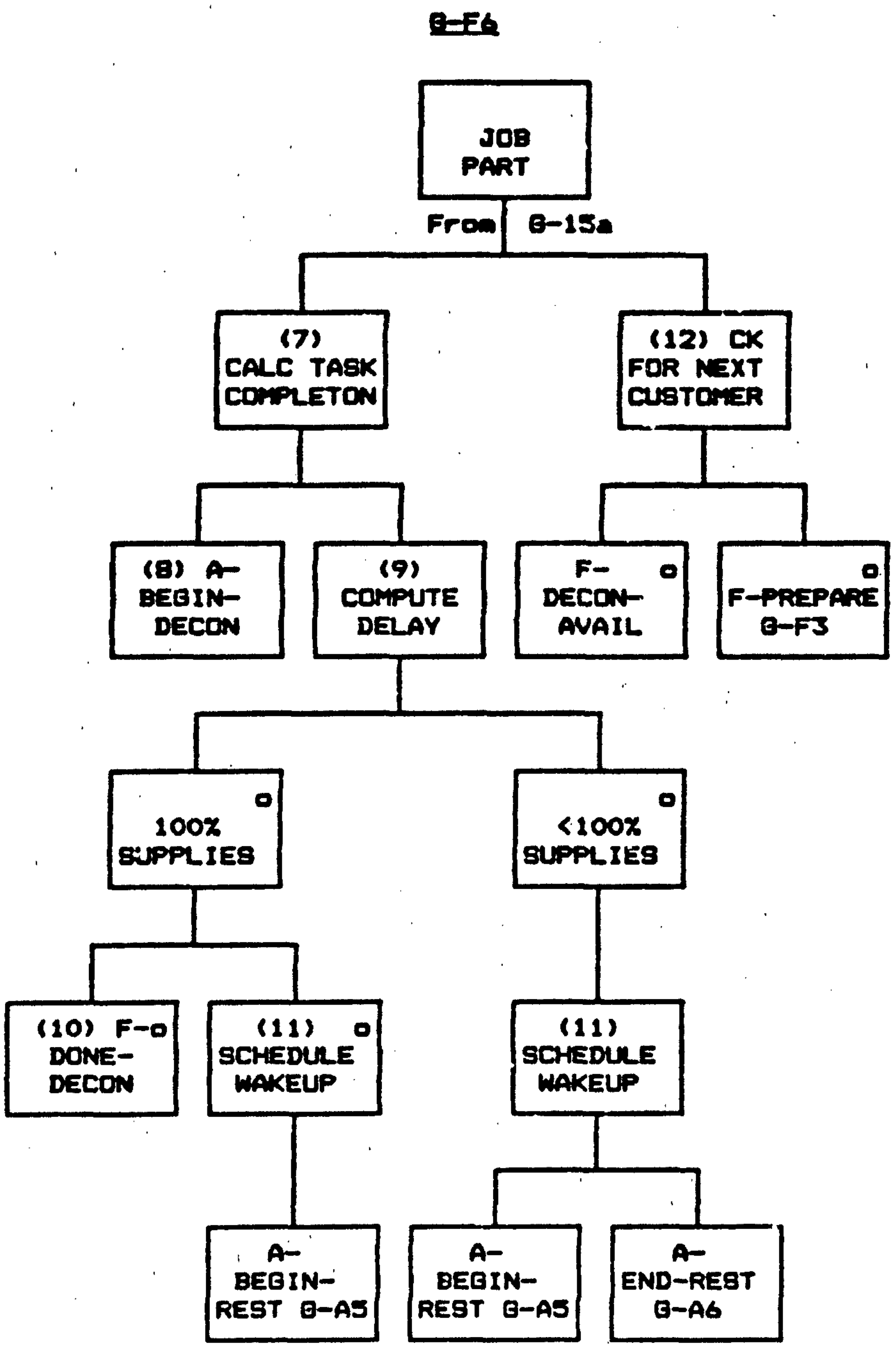

Figure G-15b. F-DECON generator (continued)

GENERATOR DESCRIPTION: F-DECON

1. READ DATA FILE 1. This function is triggered (using D1) when both a D-CUSTOMER and DECON-UNIT have arrived and are ready to begin the decon process.

2. DETERMINE SUPPLY REQUIREMENT. For each equipment type, the amount of supplies needed is calculated by multiplying the amount of each type (S6) by the amount of decontaminants needed to decon one piece (D3a). The total amount of supplies needed to decontaminate the entire D-CUSTOMER is accumulated.

3. COMPUTE WORK TIME. The time needed to complete decon of the D-CUSTOMER's equipment is a function based on the time required to decon one piece of equipment (D3a) multiplied by the quantity of equipment to be deconned (S6), the number of crews, the amount of setup time required, and the level of suppression. The total time required for the job, given the number of crews available and no suppression, is calculated (G-DF7). The amount of setup time required (D1) is added, then the suppression factor (S4) is applied. The suppression factor is provided as a percentage. The total time is multiplied by the suppression factor and the result is added in:

TOTAL TIME = [TOTAL TIME * SUPPRESSION] + TOTAL TIME.

4. TASK TIME REMAINING. The time remaining to do the task is calculated by subtracting the total time spent working on the job so far (S4) from the total time required (computed in step 3). The percentage of the task remaining is then computed by dividing the time remaining by the time required.

5. SHIFT TIME AVAILABLE. The amount of time remaining in the shift is calculated by subtracting the amount of time worked so far (S4) from the maximum time allowed (D3b).

6. DETERMINE SUPPLIES NEEDED. The amount of supplies needed to perform the portion of the job that time will allow this shift is calculated by multiplying the total supplies needed (computed in step 2) by the task remaining (computed in step 4) yielding the amount of supplies needed to finish the task.

7. TASK COMPLETION. The on-hand amount of decontaminant supplies (S4) is divided by the total amount needed (computed in step 7) to determine the percentage of the task which can be completed during the current time period. If the on-hand is greater than the amount needed, the task completion is set at 100%.

8. TRIGGER A-BEGIN-DECON. The begin decon action is triggered by passing the DECON-UNIT ID. The status flag is set to active.

F-DECON (cont.)

9. COMPUTE DELAY. Compute the scheduled delay time (task completion time) by multiplying the task time remaining (computed in step 4) by the task percent (computed in step 7).

10. SCHEDULE F-DONE-DECON. If the task completion (step 7) is 100%, F-DONE-DECON is scheduled using D2 and the delay time computad in step 9.

11. SCHEDULE WAKEUP. If the task completion (computed in 7) is greater than 0 and less than 100, the job cannot be completed during the current time period. If the problem is insufficient shift time, the beginning of the rest period is determined from the amount of time remaining in the shift and A-BEGIN-REST is scheduled to start then. A wakeup is scheduled using D7. The wakeup time is calculated by adding the length of period required to the begin rest time calculated above. If the problem is lack of supplies, A-BEGIN-REST is scheduled and a wakeup time is scheduled at 15-minute intervals until the end of the shift or until supplies arrive. When supplies arrive, A-END-REST is triggered and steps 5-8 are repeated. The 15-minute rest intervals are accumulated and applied against the overall rest period.

12. CHECK FOR NEXT D-CUSTOMER. Once the current D-CUSTOMER is scheduled for completion, the standby list is checked for another D-CUSTOMER. If no standby D-CUSTOMER is listed, F-DECON AVAILABLE is triggered. If a standby D-CUSTOMER exists, its location is checked to determine if it needs to move. If it is not at the decon site, then F-PREPARE is triggered to determine what movement is necessary.

G-F7 F-DONE-DECON TYPE: Interactive Function

SUMMARY: This function is scheduled by F-DECON when a decon job can be completed using the supplies and time available. F-DONE-CUSTOMER and A-END-DECON are triggered and the work time is checked to determine if the shift is over. If the shift is over, A-BEGIN-REST is triggered and a wakeup time is scheduled; if not, the standby list is checked for the next D-CUSTOMER. F-DECON is scheduled if a D-CUSTOMER is available and at the site; F-PREPARE is triggered if the D-CUSTOMER is assigned but not at the decon site; F-DECON-AVAIL is triggered if a D-CUSTOMER is not available.

TRIGGERED BY: Scheduled by F-DECON (G-F3)
Wakeup (scheduled by F-DECON or F-DONE-DECON)

RESULTING IN:	
F-DONE-CUSTOMER	(G-F8)
F-DECON	(G-F6)
F-DECON-AVAIL	(G-F2)
F-DECON-ATOBJ	(G-F5)
F-PREPARE	(G-F2)
DECON-UNIT	(G-E1)
D-CUSTOMER	(G-E2)
A-END-DECON	(G-A2)
DECON-UNIT	(G-E1)
A-BEGIN-REST	(G-A5)
Schedule wakeup time	

SYSTEM SPECIFICATION DIAGRAM:

See figure G-16.

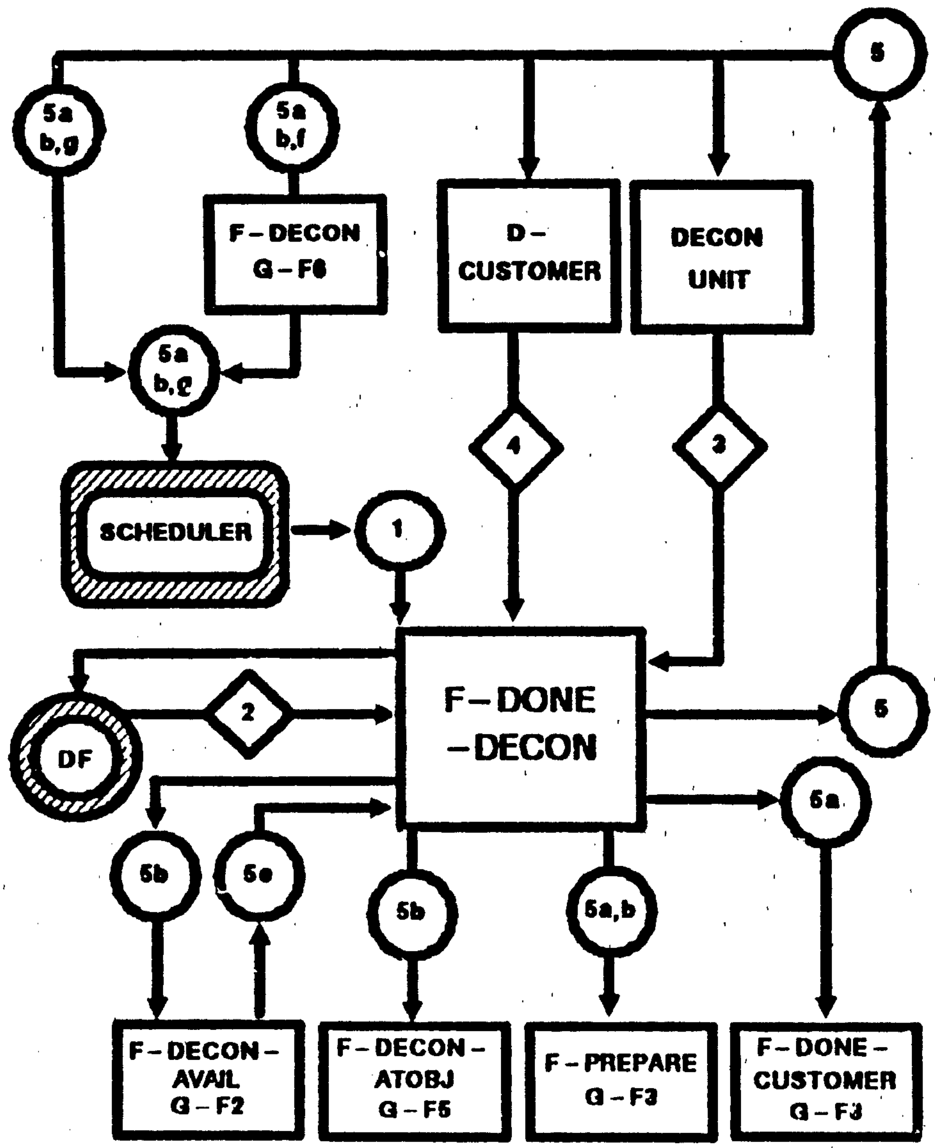

Figure G-16. F-DONE-DECON SSD

G-F7

DATA DEFINITION: F-DONE DECON

Connection Number	Data Transferred	Comments
D1	o DECON-UNIT ID	Passed by calling
	o D-CUSTOMER unit ID	function.
D2	o Maximum work time	(G-DF1)
S3	o DECON-UNIT ID	DECON-UNIT state vector.
	o Current work time	
	o Current shift start time	
	o Standby list	
	o Status flag	resting/not resting
	o Last rest period	
	o Total shift work time	
S4	o Unit ID	D-CUSTOMER state vector.
	o Unit location	
	o Status flag	
	o MOPP level	
D5a	o D-CUSTOMER unit ID	
D5b	o DECON-UNIT ID	
D5c	o Unit status	
D5d	o MOPP reset value	
D5e	o New D-CUSTOMER unit ID	
D5f	o Current location	
D5g	o Wakeup time	

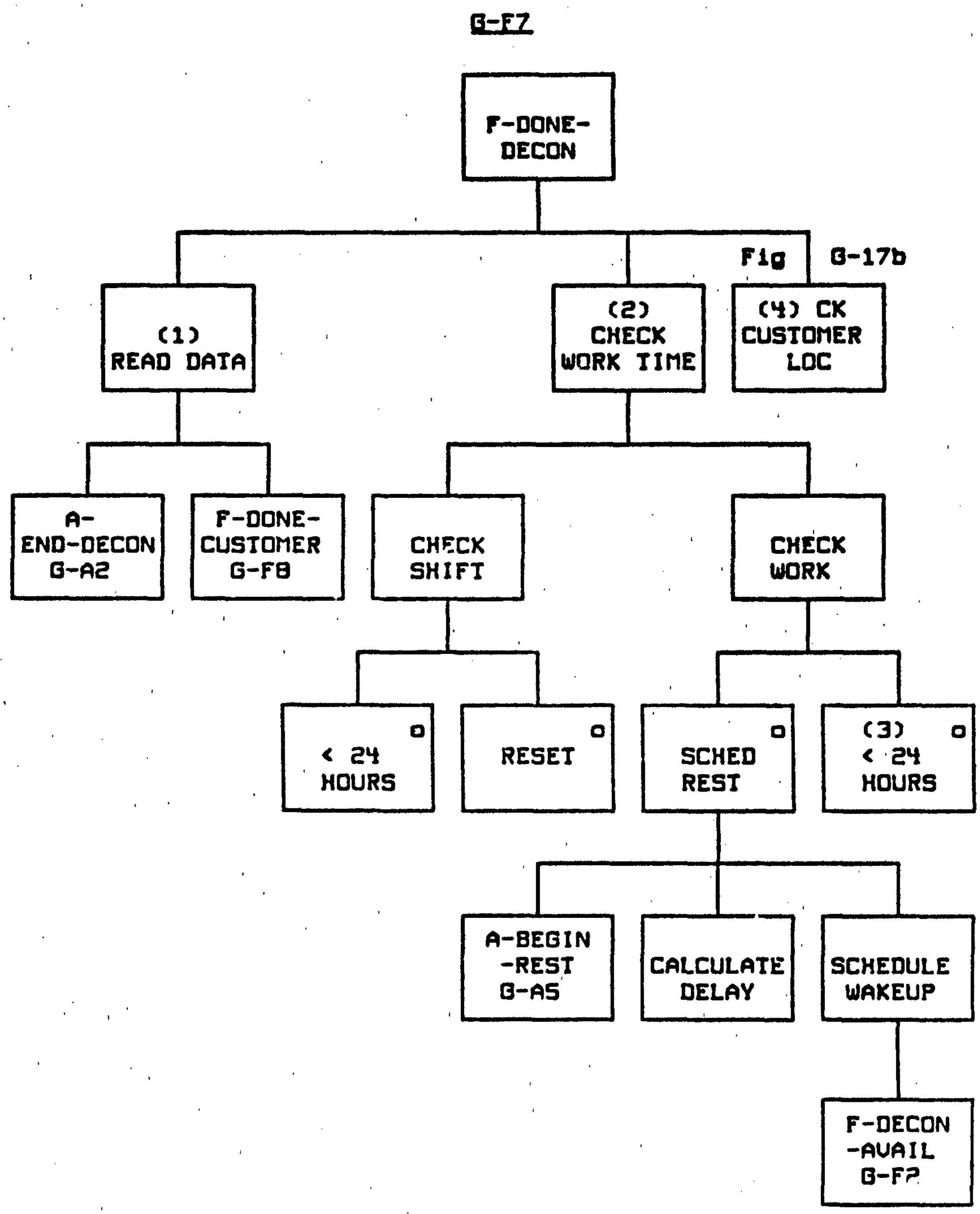

Figure G-17a. F-DONE-DECON generator

G-F7

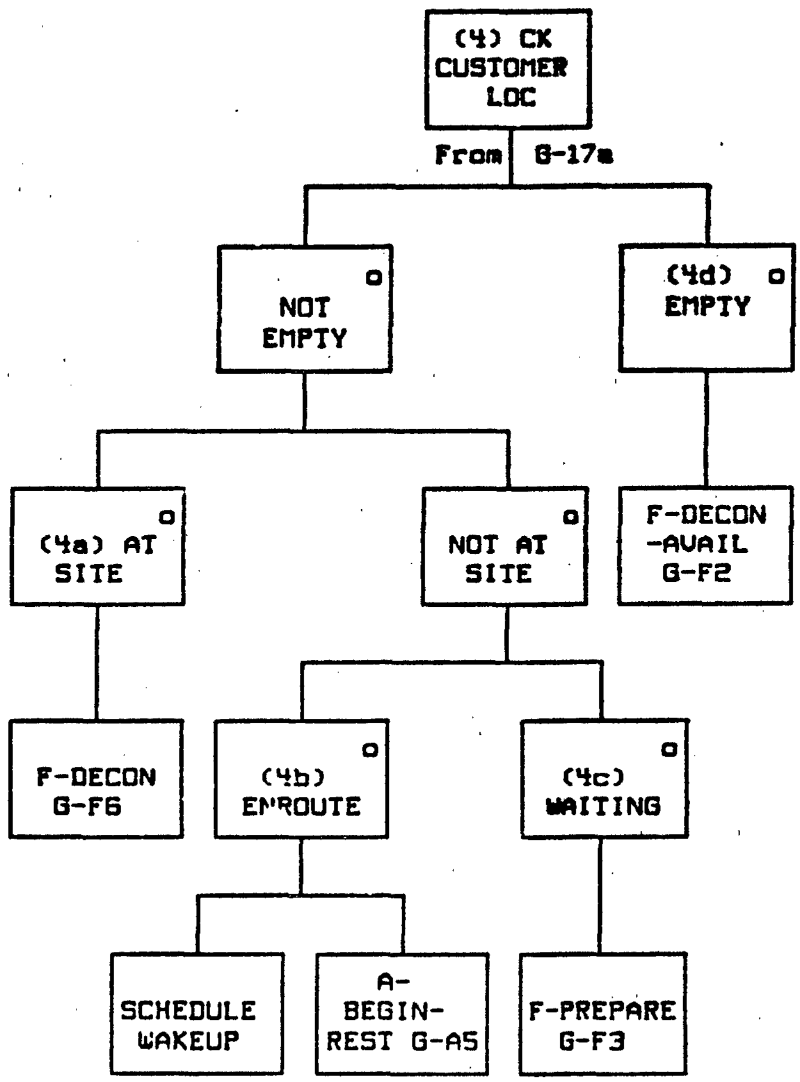

Figure G-17b. F-DONE-DECON generator (continued)

GENERATOR DESCRIPTION: F-DONE DECON

1. READ DATA FILE 1. D1 is read and A-END-DECON and F-DONE-CUSTOMER are triggered using the DECON-UNIT ID and D-CUSTOMER unit ID respectively.

2. DECON-UNIT WORK TIME. The time the DECON-UNIT has worked during the current shift (S3) is compared to the maximum shift time allowed (D2). and the total shift time is checked to see if the 24-hour period has elasped. If 24 or more hours have elapsed since the start of the shift, the shift timer is reset. If the maximum work time has been reached or exceeded, A-BEGIN REST is triggered and a wakeup is scheduled. Wakeup time is computed by calculating the amount of rest time (24-hour maximum work time) and adding it to the current time (the time the rest period is to start). The function triggered by the wakeup will be F-DECON-AVAIL.

3. NEXT D-CUSTOMER. If work time is still available during the shift, a new D-CUSTOMER is sought. If one is in the standby list (S3), it is made the new current D-CUSTOMER and F-DECON AVAIL is triggered using the DECON-UNIT ID to locate a new standby D-CUSTOMER.

4. CHECK LOCATION. The D-CUSTOMER's location is checked to see if further action is needed.

a. AT SITE. If it is currently located at the decon site, F-DECON is triggered.

b. ENROUTE. If D-CUSTOMER is currently enroute (i.e., moving), the D-CUSTOMER's status is checked to determine if it still requires decon. If not, a new D-CUSTOMER will be sought via F-DECON-AVAIL. If it does require decon, F-DECON-ATOBJ is triggered.

c. WAITING. If the D-CUSTOMER is assigned but the location has not yet been selected, F-PREPARE is triggered using D5a.

d. NONE. If no D-CUSTOMER is currently listed, F-DECON-AVAIL is triggered (using the DECON-UNIT ID) to locate a new current D-CUSTOMER.

G-F8 F-DONE-CUSTOMER TYPE: Interactive Function

SUMMARY: This function determines the D-CUSTOMER's movement objective following the completion of the decon process and triggers the movement module. If the D-CUSTOMER is a convoy and if the entire convoy is ready to leave the current site, F-TRANSP-DECON is triggered. If the D-CUSTOMER is detached and at the parent location, A-ATTACH is performed and the unit MOPP level is checked to determine if additional decon is required.

TRIGGERED BY: F-DONE-DECON (G-F7)

RESULTING IN: Triggers movement module for D-CUSTOMER
F-TRANSP-DECON (C-F16)
F-PREPARE (G-F3)
D-CUSTOMER (G-E2)
A-ATTACH (G-A6)

SYSTEM SPECIFICATION DIAGRAM:

See figure G-18.

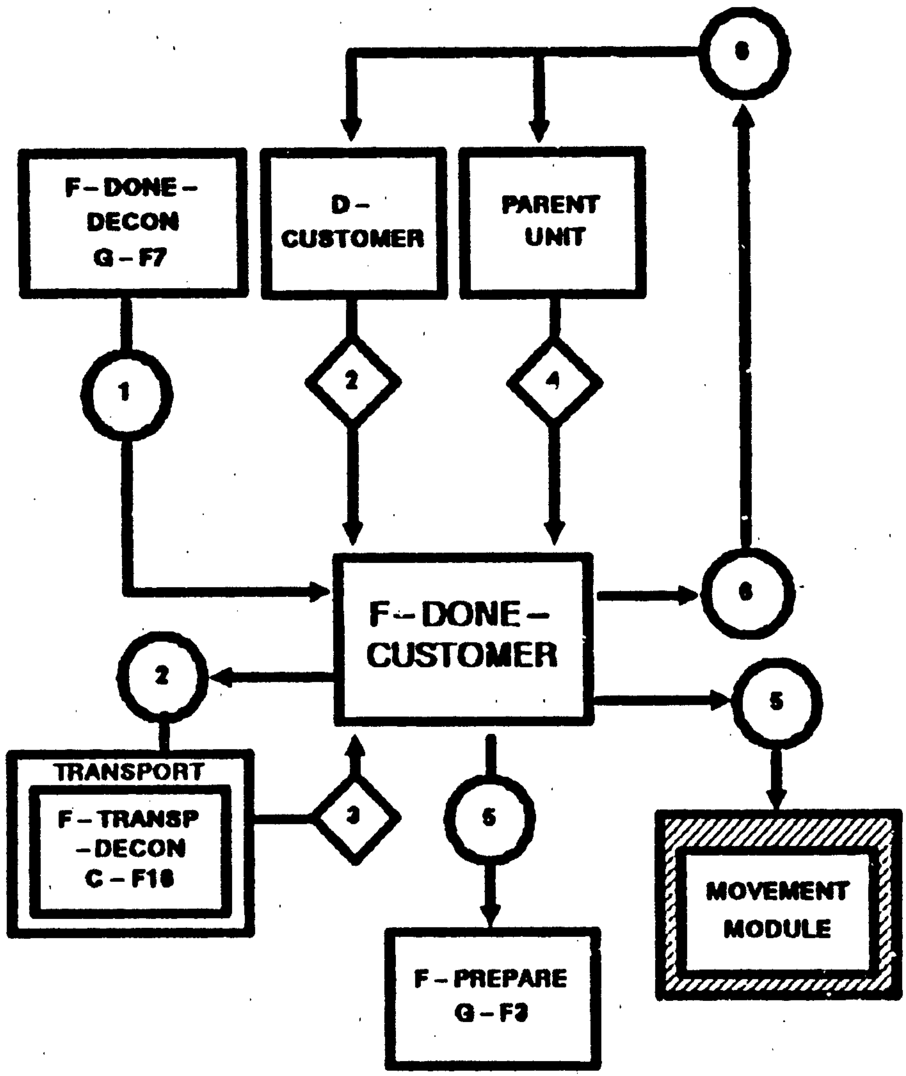

Figure G-18. F-DONE-CUSTOMER SSD

DATA DEFINITION: F-DONE-CUSTOMER

Connection Number	Data Transferred	Comments
D1	o D-CUSTOMER ID	Passed by calling function.
S2	o Objective location o Unit ID o Current unit location (decon site) o MOPP level o Supply and equipment inventory o Personnel inventory o Movement flag	D-CUSTOMER state vector.
D3	o New objective location	From F-TRANSP-DECON.
S4	o Parent unit ID o Unit location o MOPP level o Supply and equipment inventory o Personnel inventory	Parent unit state vector.
D5	o Parent unit ID o DECON-UNIT ID	
D6	o Supply and equipment inventory o Personnel inventory	

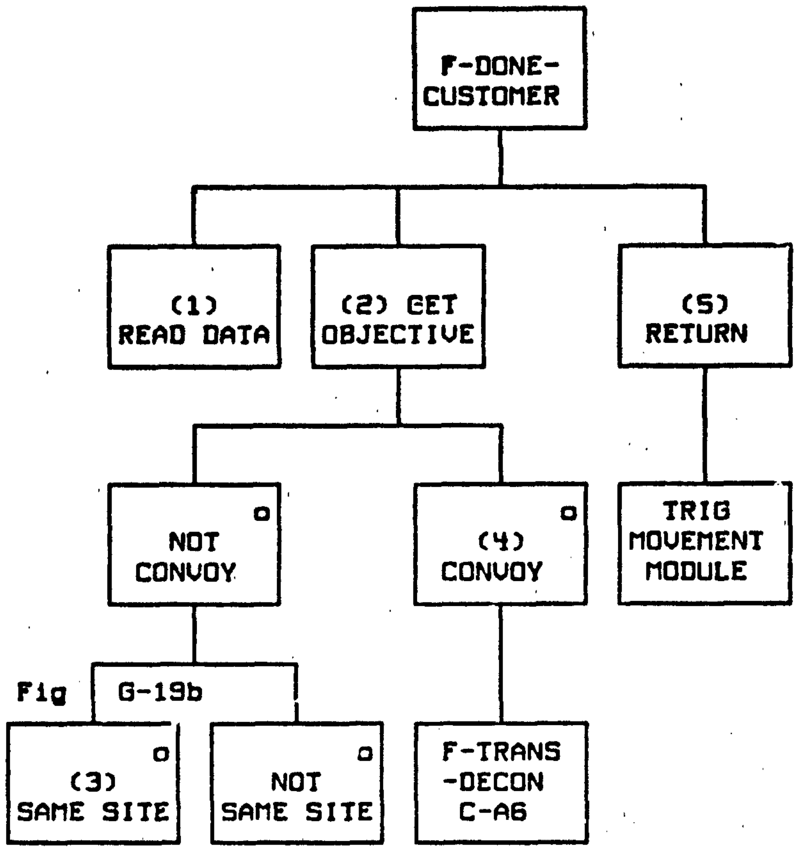

Figure G-19a. F-DECON-CUSTOMER generator

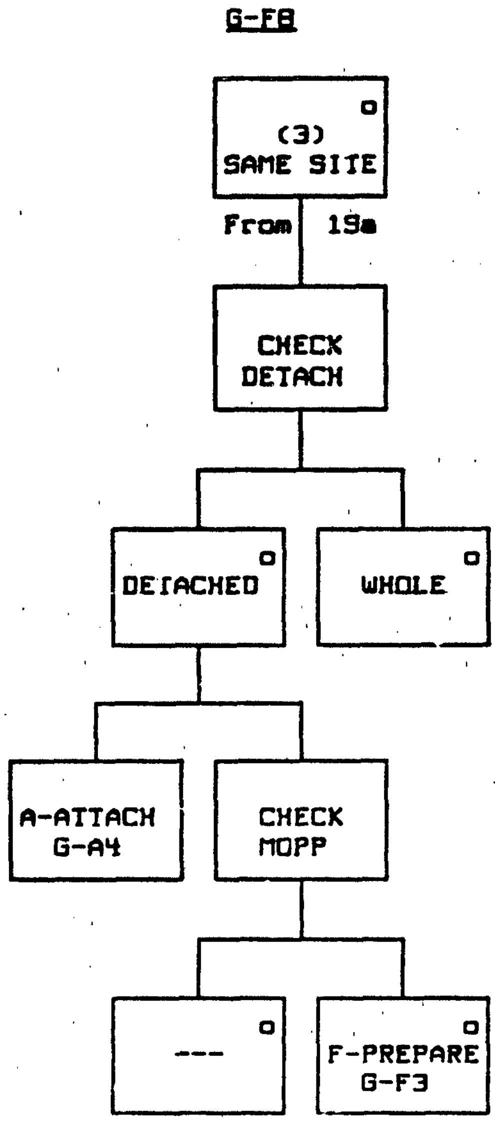

Figure G-19b. F-DONE-CUSTOMER generator (continued)

GENERATOR DESCRIPTION: F-DONE-CUSTOMER

1. READ DATA FILE 1. D1 is read to get the D-CUSTOMER unit ID.

2. GET OBJECTIVE. The D-CUSTOMER's state vector (S2) is checked to determine its next objective. The unit type is checked and if it is not a convoy, the "old unit objective" (i.e., not the decon site) is compared to the current unit location (i.e., the decon site).

3. NOT CONVOY. If the unit location and unit objective are not equal, the movement flag is set (S2). If they are equal, the D-CUSTOMER will not move (i.e., the customer was deconned at its objective location). The D-CUSTOMER is then checked to see if it was detached by comparing D-CUSTOMER unit IDs (S4, D1). If it was detached, A-ATTACH is triggered using both D-CUSTOMER and parent IDs. The parent unit's MOPP level is checked and F-PREPARE is triggered if the parent unit requires additional decontamination.

4. CONVOY. If the D-CUSTOMER is a transporter (e.g., transportation convoy), then F-TRANSP-DECON is triggered using S2 to determine the next objective. A convoy has the option of going to another decon site or going to its next scheduled objective. The objective location is returned in D3 amd the movement flag is set.

5, RETURN. The movement flag is checked and, if it is set, the module is triggered using D5.

APPENDIX H

HOST MODEL REQUIREMENTS

1. Introduction. Host model capabilities that are needed and not directly addressed in the CSS functional area design are described in this appendix. If they are not currently in the host model, they will need to be added with the MOD II design in order to exercise the full potential of the new module. General requirements (i.e., those capabilities required by more than one CSS area) are discussed in paragraph 2. Additional special capabilities (i.e., those required for a particular CSS area) are discussed in separate paragraphs below.

2. General Requirements. The designers have attempted to create a flexible design which will adapt to a number of different host models. However, certain assumptions concerning host model capabilities and structure had to be made:

a. The host model will be event sequenced.

b. The host model will be capable of handling explicit movement, attrition, contamination and suppression. Where CSS requirements differ from combat requirements, the CSS module will define the interface and attempt to conform to the host model's needs (e.g., if CSS unit effectiveness is evaluated differently, the CSS module will identify and provide any algorithm or data necessary for the enhancement).

c. The host model will be capable of measuring effectiveness levels (unit, combat, weapon, personnel) and these levels will be current when the CSS module is accessed.

d. The host model will have the ability to create temporary units (e.g., transportation and decon).

e. The host model will consider personnel. Personnel must be countable in the game (e.g.,personnel can be attritted, contaminated) so that a lack of personnel affects the the effectiveness level of a unit.

f. The host model must be capable of handling the data requirements specified as entity and action attributes in the CSS module (see the functional area appendices). The designers each attempted to identify the variables needed for each entity. These variables, or appropriate substitutes, should reside in the data structure of the host model (e.g., in the unit state vectors).

3. Main Supply Route.

a. A transportation model must look at the availability of transportation assets and constrain the supply system accordingly. However, this is only part of the problem. The road network used by the ground transporters and the capability of that network to carry the number of vehicles required to support the battle must be represented. The ability to establish and maintain movement control must also be addressed.

b. The movement of ground transportation is accomplished along the Main Supply Route (MSR). An MSR is defined by the Movement Control Center (MCC). The MCC also defines the priority of movement along the route and redefines the route if necessary. Any vehicle type and any unit type can move on the MSR. Normally supply vehicles are given priority but that can depend on the situation.

c. The CSSRO states that the module must be capable of degrading the transportation network by natural (weather, wear, etc.) or unnatural (combat damage, obstacles or congestion) causes thus necessitating traffic rerouting and subsequent delays. The CSS transportation assets must compete with other vehicle types belonging to non-CSS units for the road networks.

d. The following assumptions are made.

(1) A road network's capacity can be measured by the short tons per unit distance on the network. This assumption is consistent with the TRANATTACK Model at LOGC.

(2) The entire route a convoy will take along a MSR from start to finish is selected before a convoy enters the network.

(3) If a MSR is interdicted, the convoy will not be rerouted. A delay time will be added to the travel time. The assumption by transportation experts is that, once a route has been designated, the convoy will stay on that route. If the route is disrupted because of a blown bridge, minefield, or crater, the convoy would either call for support or find a way around the blocked area. Of course, there are always exceptions so the model will have a redirect capability.

d. The following methodology is oriented toward the CORDIVEM model but it can apply to any corps level model with some minor modifications.

(1) A separate logic will be developed for MSR so that normal model moves handled by the movement model will not select the MSR. However, the ability to select the MSR will exist for a model-generated non-CSS unit given a high priority move. The gamers will also be able to specify a move on the MSR for any unit.

(2) The gamer will define the MSR dynamically. The model will define existing road networks loaded as an MSR by the following procedure:

(a) The gamer will point to the hex at the beginning of the MSR using the cursor.

(b) The gamer will then point to the hex where the first major node of the network is located. A road network must already exist between these two points.

(c) The model will determine the shortest existing road network between the two points. A linked list of the hexes along this network is generated.

(d) More than one road can exist on a hex side. One of the roads is flagged as an MSR. The road flagged as an MSR cannot be used by the movement module without going through the MSR logic.

(e) Each hex is considered one road link. For each link, the following information is kept:

- Road type. The road types defined in CORDIVEM are Autobahn, Primary, Secondary, and Tertiary. The capacity of each of these road types will be defined for a 3.57-km link.

- Current weight on road. A total convoy weight will be a state variable for each convoy. If non-convoy units use the MSR, accumulate a total weight for the unit. Add this weight to the hex link as it enters and subtract it from the hex as it leaves. The total weight of all the convoys cannot exceed the capacity defined in (1) above.

- List of units on the road. In addition to the unit occupancy list, a list of all units using each MSR is kept.

- Time next unit leaves the link. The movement module computes the time to travel 1 hex distance. When this is done, the state variable defining the time the next unit leaves is checked against the computed travel time. If the unit just computed will leave earlier than the time in the state variable, the time the next unit is to leave is replaced in the state variable.

(3) The model will move a convoy along an MSR by the following procedure:

(a) When a convoy gets an order to move, search for the shortest route to the objective. The objective probably will not be located on an MSR node. Find the node that is closest to the objective and move to that node by the shortest route. This search process is performed only once before the move starts so the computer time consumed is not repeated. Keep a linked list of hexes to the objective node for each convoy.

(b) Check the first link to determine if the weight capacity of the link minus the total weight already on the link is greater than the total weight of the convoy.

(c) If the remaining capacity of the link is less than required, wait until another unit moves off of the link. Put the unit in a first-in, first-out (FIFO) queue.

(d) If the remaining capacity of the unit is greater than required to accommodate the convoy, add it to the list of units at that link, add its weight to the total weight occupying the link, and compute the delay time to cross the link.

(e) When a unit leaves a link, check to see if another unit from a different direction is ready to move in. Check the waiting queue for each link (defined in (c)). If a unit is on the queue, repeat steps (d) and (e).

e. The designers feel that the MSR use should be restricted to CSS units at this point in the design development. Transportation experts have argued on both sides of the issue.

(1) Those wanting all unit types to move on MSRs point out that the MCC can and does allow any unit in the corps to use an MSR if it has high priority.

(2) Those wanting only CSS units to move on the MSR point out that except for an extreme circumstance, such as one corps passing through another corps, the MSRs are located in the rear area and are reserved for supply vehicles.

f. The process described would allow for any unit to use an MSR but the realism will be questionable. An inherent assumption in the process is that a convoy will fit in a 3.57-km hex. This would not be true for a maneuver battalion on a road march. Current CORDIVEM methodology places a unit in the hex where the unit center is located. If the user will accept this limitation, then the weight restriction comes into play. The total weight of a maneuver unit would certainly exceed the limit of one link of the road. This would mean that, when a maneuver unit moves on an MSR, no other traffic could be on that portion of the road.

4. Reconstitution.

a. Reconstitution is the act of restoring units to desirable levels of combat effectiveness commensurate with mission requirements and the availability of resources. Reconstitution exists in two main forms: reorganization and regeneration.

(1) Reorganization is the redistribution of internal resources within a degraded unit to increase its level of effectiveness: personnel and equipment can be traded to balance combat capabilities; crews can be built for operational weapon systems and composite units can be formed from several devastated units.

(a) Immediate battlefield reorganization is the action taken to quickly restore degraded units to minimum levels of combat capability. It is considered a temporary measure and is normally implemented by the affected commander in or close to the specified location.

(b) Deliberate reorganization involves actions taken to restore combat capability when greater time and resources are available but not in sufficient quantities to permit a complete rebuilding of the unit (i.e., regeneration). Procedures used are similar to those of immediate battlefield reorganization but deliberate reorganization will normally occur farther to the rear.

(c) The primary objective of reorganization is to temporarily improve the combat capability of a unit until more extensive efforts can occur. It is the primary means by which combat power can be maintained during the early stages of a conflict and it provides a basis upon which regeneration efforts can be designed. In addition, it is the option most frequently executed by commanders and provides a means of maintaining a continous level of combat effectiveness with a minimum of training requirements.

(2) Regeneration is the reconstruction of a unit through large-scale replacement of personnel, equipment, and supplies. The intensive nature of regeneration may require the withdrawal of the unit to a designated, protected area where personnel, equipment, and supplies can join together. Regeneration is considered the more difficult reconstitution option to execute because it requires the greatest amount of effort, coordination, and training.

(a) Incremental regeneration is the infusion of individual personnel replacements and single equipment items as shown in the WSRO process.

(b) Whole unit regeneration is the complete replacement of entire units or definable sub-elements.

(c) Aspects of the reconstitution concept would be appropriate additions to the MOD II personnel operations; however, its inclusion in the model must be carefully considered by other areas as well. Because reconstitution is a replacement system for both equipment and personnel, it would depend heavily upon the supply, transportation and movement capabilities of the model.

b. Currently, the immediate battlefield reorganization process could be adopted for personnel and equipment using many of the available functions and incremental regeneration is already represented in the WSRO process. (See chapter 5, paragraphs 5 and 6 and the appendix E annex.) Unit reorganization would be handled by identifying one unit as a supplier and one unit as a customer and designating the number of each type of weapon system to be transferred from the supplying unit to the customer. This event would be triggered by a game controller who would provide the necessary information (e.g., the unit IDs and the amount and type of systems involved). The amount to be transferred could be given either in quantities (preferred) or in percentages. A decision table containing possible reorganization situations could be defined (e.g., threshold levels of unit effectiveness, special combinations of unit status and battle strategy). During a unit evaluation, the decision table would be checked and the gamer notified if necessary. The gamer would then make the decision.

c. Because deliberate reorganization and whole unit regeneration require movement of all or part of the unit, it is recommended that these options be handled by the host model with its normal unit maneuver capabilities. Situations could be defined (as in 4b above) in which the game controller would be notified to decide whether or not to regenerate a unit. If the decision is to regenerate a unit, the gamer designates which units are involved, what movement is necessary, the priority of the moves and the objective locations.

5. CSS Unit Attrition.

a. All units in the corps battlefield must be subject to attrition. The designers of this combat service support (CSS) module recognize that, as CSS units are assessed and equipment is lost, the unit capability is degraded. All processes developed for this module take this into consideration.

b. The designers recognize that the biggest difficulty in modeling the attrition of CSS assets in a corps-level model is the availability of data. The fractional damage of an artillery round against an armored unit is readily available. The fractional damage of an artillery round against an ammunition supply point or a maintenance depot is not available. This does not reduce the importance of such data.

c. The designers cannot suggest where such data can be acquired. However, before a reasonable representation of CSS on the battlefield an be obtained, this attrition must be represented.

6. **Rear Battle.**

a. The latest rear battle doctrine addresses the concept of grouping combat support and combat service support units for security. Units will be formed into a base cluster for mutual support (FM 90-14). The base cluster commander will establish a base cluster operations center (BCOC) for command and control purposes. The BCOC will be manned by personnel and equipment inside the cluster.

b. The current CORDIVEM model will allow any unit to be attacked in direct fire ground combat. Each unit, however, fights individually. An attacking unit would move easily between support units in the rear.

c. Support clusters could easily be modeled using the following methodology:

(1) An interactive routine could be developed to allow a gamer to build a cluster. He could define the cluster name and point to cluster members.

(2) The cluster member would retain the member name. Cluster membership would not effect the operational performance of a support unit.

(3) A maximum separation distance should be loaded. If a unit moves, it could automatically lose its membership in a cluster by exceeding a specified distance from other members.

(4) When any of the cluster members is attacked in ground combat, all units would be under attack. The ground combat module would use the assets from all of the cluster members to compute the defenders firing capability. If military police (MP forces are to be played as part of a cluster's defense, the MP assets can be loaded into one of the cluster members.

d. The model will automatically adjust assets of a unit in combat as a function of operation and threat. These would simulate the command and control duties of the BCOC.

e. The model will automatically restrict the movement of an attacking unit through a defending unit. Because the cluster unit would be considered a single unit by the ground combat module, movement through the individual support units would be resticted. This would give the clustered units an advantage over the non-clustered units in CORDIVEM.

7. Level I and II Threat

a. A level III threat (see FM 90-14) is the only enemy threat activity that can be explicitly represented in a corps-level model. Level I threat (e.g., enemy agent sabotage and terrorism) and level II threat (e.g., raids and ambush by small teams) can not be explictly represented. However, there is no doubt that these activities can impact on a support unit's performance.

b. For several reasons (e.g., model resolution, the lack of credible data), the designers feel that the impact of both level I and level II threat should be represented in a very simple, aggregated manner.

c. The following methodology is suggested:

(1) Reserve one word for every resolution unit played. This word would be the amount of degradation suffered in the performance of its task because of level I and level II threat.

(2) The gamer can enter the amount of this degradation by unit or by echelon. He could also enter a time that it would be lost. An event would be set to remove the degradation (i.e., reset the value to zero).

(3) If the gamer enters the value by echelon, every unit in that echelon would be affected. For example, if a brigade is affected, all battalions and support units in the brigade would be affected.

8. Chemical Module. The chemical module is responsible for putting a unit in MOPP and designating the unit's MOPP level before the unit is contaminated. The chemical module should also be able to trigger the decontamination process. The decon module (see chapter 8 and appendix G) is designed to be triggered either through gamer intervention or by the chemical module whenever a unit has been contaminated by a persistent or semipersistent hazard.

9. Supply Module. Numerous lists of various types must be maintained by the host model in order to accomodate the supply module. The supply module must be able to create, change and delete elements from numerous types of lists including queues, allocations, etc. Also, the affect of actions taken by other modules on elements (e.g., units, supplies, etc.) in lists that the supply module deals with must be portrayed by the host model. The host model requirements that have been identified are listed and briefly discussed in the following paragraphs.

APPENDIX I

GAMER INTERFACES AND OUTPUT

1. TRANSPORTATION-GAMER INTERFACES.

DECON SUPPORT

SUMMARY: A gamer can designate decon support for a unit. The gamer must move a decon unit to the supported unit before making the designation. Decon can be performed on all transporters leaving the supported unit, entering the supported unit, or both.

INPUT DATA:

Supported unit ID	Decon unit ID
Support Type:	0 = No Decon
	1 = Leaving Unit
	2 = Entering Unit
	3 = Leaving and Entering

BUILD MSR

SUMMARY: A main supply route (MSR) will be distinguishable from other road networks. Ground transport units will select an MSR before delivering supplies. It can exist in the same hex as other routes and will restrict traffic. It can be defined by cursor or hex numbers input in order.

INPUT DATA: Location of each connecting node.

REDIRECT

SUMMARY: The objective of a unit can be changed while the transporter is enroute. The gamer can change the supplier or the customer.

INPUT DATA:
New objective unit ID
Supplier or customer ID
Transporter ID

2. SUPPLY-GAMER INTERFACES.

SEND SUPPLY CONVOYS

SUMMARY: The gamer can send a supply convoy from a supply unit to a receiving unit, assuming both supply and transportation assets are available one or more times on either a periodic basis or a gamer-specified schedule. The gamer enters either the list of supplies to be shipped each time or a planning factor for each supply item. The planning factors would be set up to vary the shipment by some amount dependent upon the number of personnel or systems on-hand.

INPUT DATA: Receiving unit ID   Sending unit ID
(Supply Type, Item#, Quantity)*Repetitions
Shipment time(s)

RELOCATE SUPPLY BASE

SUMMARY: The gamer can specify that a supply base be moved to a specific location starting at a certain time. If adequate transportation is available and enough time is allowed, the move should take place on schedule. The support relationships remain the same unless the gamer changes them because a new unit assignment (a new temporary boss) triggers the gamer to assign the new support relationships.

INPUT DATA: Supply base ID   New XY location
Begin move time

SET/CHANGE SUPPLY SUPPORT RELATIONSHIP PER UNIT

SUMMARY: At any time before or during the running of the game, the gamer can set/change the assigned suppliers of a unit. Each unit will have a primary, a secondary, and three alternate suppliers for each RO supply type and a primary and secondary supplier for all other supply types.

INPUT DATA:

Unit ID	Supply type
Primary supplier	Secondary supplier
Alternate 1	Alternate 2
Alternate 3	Event time

2. SUPPLY-GAMER INTERFACES (cont.).

SET THE DAILY CONTROL SUPPLY RATE (CSR)

SUMMARY: The gamer will set the controlled supply rate for the various supply items off-line every 24 hours for the next day. This was described in some detail in the Supply chapter (Volume I, chapter 4) in paragraph 7a(2)(b).

INPUT DATA:
- War duration estimate
- Supply type
- Control possible items list
- Control threshold fraction
- Corps-level apportionment
- Division-level apportionment
- Brigade-level apportionment

CHANGE RESUPPLY THRESHOLDS PER UNIT/SRC

SUMMARY: The gamer can at any time change the resupply thresholds that are used. Each unit has up to three thresholds for each RO supply type (the number will vary depending upon the unit status, etc.). (Note: an alternative method would be to use a command and control process (F-COMMANDER) to change the threshold levels. This would allow more factors to be considered.)

INPUT DATA:

Unit ID/SRC	Supply type
New thresholds	Event time

CHANGE AUTHORIZED QUANTITY OF SUPPLY PER UNIT OR SRC

SUMMARY: The gamer can change the authorized level of a supply type or a supply item by some fractional amount for a unit or SRC by echelon or operation. The new authorized level can be set for one to infinite repetitions of supply check. This interface changes the level of supplies that the supply process attempts to maintain; it is not performing "magic" resupply.

INPUT DATA:

Unit ID/SRC	Supply type
Echelon	Operation code
Repetitions	Event time

2. SUPPLY-GAMER INTERFACES (cont.).

TRIGGER RESUPPLY CHECK

SUMMARY: This interface gives the gamer the capability to cause a resupply check immediately for a unit or SRC type per echelon and operation.

INPUT DATA: Unit ID/SRC — Supply type
Echelon — Operation code
Event time

CHANGE RESUPPLY CHECK SCHEDULE

SUMMARY: The gamer can change scheduled resupply check times for a unit or SRC type per echelon and operation.

INPUT DATA: Unit ID/SRC — Supply type
Echelon — Operation code
Event time

CHANGE SUPPLY TYPE CHARACTERISTIC FILE (D-DF5)

SUMMARY: The gamer can change the data in the supply type characteristics file to include the fraction of throughput (TP) or ALOC in the theater each day for a given unit or SRC type. The fraction of TP or ALOC arriving at the other units will be automatically adjusted.

INPUT DATA: Unit ID/SRC — Supply type
Echelon — Fraction received
Event time

CHANGE SUPPLY ITEM ATTRIBUTE FILE (D-DF6)

SUMMARY: The gamer can alter the data in the supply item attribute file to include the total amount of a supply type or supply item arriving in the theater, total ALOC arriving, exception flag, etc.

INPUT DATA: Day — (Supply Item, Amount)*

2. SUPPLY-GAMER INTERFACES (cont.).

CHANGE RQ SUPPLY ITEM FORECAST DATA FILE (D-DF7)

SUMMARY: The gamer can alter the data file of the forecast amount of a supply item per gamed systems or nongamed systems for a unit or standard requirements code (SRC) type per echelon and operation.

INPUT DATA:	Unit ID/SRC	Supply item
	Echelon	Operation code
	Repetitions	Event time

3. PERSONNEL-GAMER INTERFACES.

UPDATE UNIT STATUS

SUMMARY: The gamer can change a unit's personnel-receiving status by setting or resetting the unit's live/dead flag.

INPUT DATA: Unit ID Flag status

RELOCATE R-POOL

SUMMARY: The gamer will be able to change the R-POOL servicing a unit by entering the customer ID and the new R-POOL ID. The change will be recorded in both the customer state vector and in the R-POOL list.

INPUT DATA: Customer ID (new) R-POOL ID

RELOCATE DISTRIBUTION POINT

SUMMARY: The gamer can change a unit's distribution point by selecting the new distribution point and mapping it to the customer in the distribution point table.

INPUT DATA: Customer ID (new) Distribution point ID

3. PERSONNEL-GAMER INTERFACES (cont.).

TARGET EFFECTIVENESS LEVELS

SUMMARY: The allocation table consists of the target weapon effectiveness levels for every unit in the game. The target levels give the level of weapon effectiveness to be reached if 100% weapon effectiveness cannot be reached. The gamer can change a unit's target level to anticipate future needs.

INPUT DATA: Unit ID Target level
Opcode (optional)

CREW SIZE

SUMMARY: The gamer may chance a weapon system's crew size from full crew to minimum crew by setting the max and min flag.

INPUT DATA: Weapon system ID

UNIT PERSONNEL INVENTORY

SUMMARY: A personnel inventory shows the maximum number of each personnel category needed by a unit to man its systems and perform its tasks. The gamer can alter the number of personnel allotted to a unit but it is reccommended that this only be done in conjunction with alterations on the weapon system/task inventory.

INPUT DATA: Personnel category Unit ID
Category quantity

PERSONNEL REDISTRIBUTION

SUMMARY: It is desirable that the distribution of personnel reflect the most recent command control decisions. When a unit's personnel allotment will be affected (i.e., when the unit effectiveness target levels have been changed), the gamer can set the unit's CC flag.

INPUT DATA: Distribution point unit ID Unit ID

3. PERSONNEL-GAMER INTERFACES (cont.).

DELIVERY TIMES

SUMMARY: A delay table will be used to determine how long the personnel assignment (ASSGN) will take to be (completely) delivered. The gamer may alter the times to better reflect nonparametric conditions.

INPUT DATA: R-POOL ID Unit ID
Distribution point ID Delay time

4. DECONTAMINATION-GAMER INTERFACE.

DECON REQUEST

SUMMARY: A unit can be directed by a game controller to receive decontamination. The unit must have been hit by either persistent or semipersistent agents. In addition to specifying a unit to be deconned, the gamer can specify the decon unit and the decon site.

INPUT DATA: Contaminated unit ID Decon unit ID
Decon site (optional)

5. HISTORY OUTPUT.

a. The designers of this model spent considerable time working with the school representatives and the anticipated model users learning each functional area and identifying the anticipated model usage and output requirements.

b. Analysts from the Studies and Analysis Directorate (SAD) and Scenario and War Gaming Directorate (SWG), Combined Arms Operations Research Activity (CAORA) provided the designers with a list of output data needed to support the analysis of studies they anticipate will be done with a balanced corps-level model. Listed below are the logistics output requirements for the Combined Arms Mission Area Analysis provided by SAD:

o Major Equipment Items.

- Number of damaged or destroyed items that were not replaced within expected time.

- Reason for nonreplacement

oo Evacuation capability shortfall

- Equipment
- Crews
- Road congestion

oo Repair capability shortfall

- Support unit overload
- Repair parts

oo Replacement shortfall

- Items not available
- Reason?

o Petroleum, oils, and lubricants (POL), ammo

- Number of times that shortages were noted (unified requests?)

- Reason for shortage

oo Supply point shortfalls (reason?)

oo Carrier capability from supply point to unit

- Equipment
- Personnel
- Road congestion

o Personnel

- Number and type of units not returned to full strength within expected time

- Reason for shortfall

oo Evacuation system capability

oo Medical facility capability

- Capacity
- Personnel
- Equipment and Supplies

oo Personnel replacement system

- Military occupational specialty (MOS)

c. Each designer performed a detailed analysis of his functional area to determine where in the model logic the output functions should be located. The result of this analysis was predictable: the output data needed by the analyst could be extracted from the action generators.

d. For the designers, the review of each functional area was an affirmaton of their ideas concerning the JSD methodology:

(1) The entities were selected because they were the critical elements in the simulation that needed to be tracked. Any real world entity that was considered important to a corps-level model was made a model entity.

(2) The actions for each entity were selected because they represent key changes of state in the entity.

e. The entities that are selected for the model should be those that need to be traced by the analyst. The actions selected should represent the events that are important in the life of the entity and that record a change in the entity. The JSD entities and actions should correspond to the entities and actions of interest to the analyst.

f. Each time an action is executed for an entity, the data changes should be recorded in the history file. As described above, this file will consist of all the key event data for the simulation. With very few exceptions, this is all that is needed to meet the output requirements of the users. The exceptions thus far identified lie in the personnel operations area and are listed below:

(1) The Soldier Support Center has requested strength accounting output data. The data will be accumulated for an entire period (24 hours) for each replacement pool (R-POOL), for each echelon, and for each period. The information available will be the number of each personnel category requisitioned, the unit requesting the personnel, the reason (i.e., unit shortfall or weapon system replacement operation (WSRO) crew request), and the number of personnel of each category supplied.

(2) Other possible personnel outputs would include the number of substitute personnel provided for a given personnel category; the length of time required to satisfy WSRO requests; the length of time required for replacement personnel to reach their assigned unit; and the number of personnel assignments cancelled or rerouted.

APPENDIX J

DATA REQUIREMENTS

1. DATA FILE CROSS-REFERENCE.

REF	NAME	USER	
C-DF1	CONTROL UNIT REPORT STRUCTURE	F-DIRECT-RQST	(C-F2)
C-DF2	MAXIMUM REQUEST LIFE	F-TCONTROL	(C-F3)
		F-TSUPPLIER	(C-F4)
C-DF3	HAULING CAPACITY	F-TCONTROL	(C-F3)
		F-TSUPPLIER	(C-F4)
C-DF4	COMMODITY MEASURE	F-TCONTROL	(C-F3)
		F-TSUPPLIER	(C-F4)
C-DF5	TRAVEL TYPE	F-TSUPPLIER	(C-F4)
C-DF6	IMPLICIT MOVE RATE	F-GND-IMP-TRAVEL	(C-F7)
		F-AIR-IMP-TRAVEL	(C-F8)
		F-SCHED-IMP-TRANSP	(C-F14)
C-DF7	PM DATA	F-TRANSP-PM	(C-F12)
C-DF8	MINIMUM TRANSPORT SIZE	F-SPLIT-CK	(C-F13)
C-DF9	IMPLICIT UNIT	MANY	
C-DF10	IMPLICIT STATIONARY DATA	F-SCHED-IMP-TRANSP	(C-F14)
C-DF11	T-SUPPLIER C2 TIME	F-TSUPPLIER	(C-F4)
C-DF12	T-CONTROL C2 TIME	F-TCONTROL	(C-F3)
D-DF1	SCHEDULED SUPPLY CHECK	F-RO-RQMT	(D-F1)
D-DF2	SCHEDULED SUPPLY CHECK TIMES	F-RO-RQMT	(D-F1)
D-DF3	SYSTEM FUEL CONSUMPTION	F-FUEL-USED	(D-F2)

REF	NAME	USER	
D-DF4	RESUPPLY THRESHOLDS	F-RO-SUPPLYCK	(D-F3)
D-DF5	RO SUPPLY TYPE CHARACTERISTICS	F-RO-SUPPLYCK	(D-F3)
D-DF6	RO SUPPLY ITEM CHARACTERISTICS	F-RO-SUPPLYCK	(D-F3)
		F-ALLOC-ORDER	(D-F14)
D-DF7	SUPPLY TYPE RQMNT FORECASTS	F-RO-SUPPLYCK	(D-F3)
D-DF8	PLANNING FACTORS	F-PF-RQMT	(D-F5)
D-DF9	PLANNING FACTOR SUPPLY SCHEDULE	F-PF-RQMT	(D-F5)
D-DF10	SPECIAL SUPPLY ORDERS	F-JF-RQMT	(D-F6)
D-DF11	WSRO MEI AMMO/FUEL BASIC LOADS	F-WSRO-SPLY-RQD	(D-F8)
		F-SHIP-AVAIL	(D-F10)
		F-ALLOC-ORDER	(D-F14)
D-DF12	SUBSTITUTES FOR SUPPLY ITEMS	F-SUPPLY-RQST	(D-F11)
E-DF1	SYSTEM/CREW TABLE	F-PEREP	(E-F1)
		F-CALPER	(E-F6)
		F-ARRCRU	(E-F12)
		F-CHINV	(E-F4)
E-DF2	R-POOL LIST	F-PEREP	(E-F1)
E-DF3	DISTRIBUTION POINTS	F-PEREP	(E-F1)
E-DF4	SUBSTITUTION TABLE	F-LOCPER	(E-F13)
E-DF5	ALLOCATION TABLE	F-ALLPER	(E-F5)
E-DF6	STANDARD INVENTORY	F-PEREP	(E-F1)
E-DF7	DEMAND GROUP	F-PEREP	(E-F1)
		F-NUWSR	(E-F7)
		F-OLWSR	(E-F8)
		F-FILLWS	(E-F9)
		F-SUPPER	(E-F10)
		F-CHKCUS	(E-F11)
E-DF8	W-QUEUE	F-PEREP	(E-F1)
		F-ALLPER	(E-F5)
		F-CALPER	(E-F6)

REF	NAME	USER	
E-DF9	WSR-QUEUE	F-WSRO	(E-F2)
		F-NUWSR	(E-F7)
		F-OLWSR	(E-F8)
		F-FILLWS	(E-F9)
		F-ARRCRU	(E-F12)
		F-SUPPER	(E-F10)
		F-CHKCUS	(E-F11)
		F-CALPER	(E-F6)
E-DF10	RQMT	F-PEREP	(E-F1)
		F-CHINV	(E-F4)
		F-ALLPER	(E-F5)
		F-CALPER	(E-F6)
E-DF11	T-QUEUE CEILINGS	F-PEREP	(E-F1)
F-DF1	DAILY-AVAILABLE-RESOURCE HOURS	F-REP-RES-ALLOC	(F-F1)
		F-HOLD/MOVE-ASSESS	(F-F2)
F-DF2	RESOURCE-TYPE-SUBSTITUTES	F-REP-RES-ALLOC	(F-F1)
		F-HOLD/MOVE-ASSESS	(F-F2)
F-DF3	PERSONNEL/VICTIM-TYPE PROBABILITY-TABLE	F-TRANSFORM	(F-F3)
F-DF4	SYSTEM-TYPE/ROUND-TYPE/VICTIM-TYPE PROBABILITY-TABLE	F-TRANSFORM	(F-F3)
F-DF5	RJ-TYPE-CLASSES	F-TRANSFORM	(F-F3)
		F-RAM/DNBI-INIT	(F-F4)
F-DF6	SYSTEM-TYPE/RAM-DNBI-TYPE PROBABILITY-TABLE	F-RAM/DNBI-INIT	(F-F4)
F-DF7	RECOVERY-VEHICLE-TABLE	F-RECOVERY	(F-F6)
F-DF8	DAILY-AVAILABLE-RECOVERY VEHICLE RESOURCE HOURS	F-RECOVERY	(F-F6)
F-DF9	LIKE-RECOVERY-SYSTEMS	F-RECOVERY	(F-F6)
F-DF10	REPAIR-JOB-RECOVERY-VEH HOURS-REQUIREMENT	F-RECOVERY	(F-F6)
		F-RECOVERY-SUPPORT	(F-F7)
		F-RECOVERY-SHORT	(F-F8)

REF	NAME	USER	
F-DF11	REPAIR-JOB-TEMPLATE	A-CREATE	(F-A1)
		A-ABANDON-RJ	(F-A12)
		A-PASSBACK-RJ	(F-A2)
		A-COMBINE-RJ	(F-A3)
		A-CLASSIFY-RJ	(F-A4)
F-DF12	UNIT ASSETS	MANY	
F-DF13	REC-EVAC-CAPABILITIES	F-EVAC-MANAGER	(F-F11)
F-DF14	RJ-LOAD/UNLOAD-TIME	A-CONTAMINERJ	(F-A4)
G-DF1	DECON MAXIMUM SHIFT TIME	F-DECISION	(G-F1)
G-DF2	DECON UNIT REPORT STRUCTURE	F-DECISION	(G-F1)
G-DF3	CONTAMINATION LIFE TABLE	F-DECON-AVAIL	(G-F2)
G-DF4	DETACHMENT-PERCENTAGE TABLE	F-PREPARE	(G-F3)
G-DF5	SYSTEM TYPE QUANTITY	F-DECON	(G-F6)
G-DF6	DECON SETUP TIME	F-DECON-ATOBJ	(G-F5)
G-DF7	DECON PROCESS TIME	F-DECON	(G-F6)
G-DF8	DECON CLEANUP TIME	F-DONE-DECON	(G-F7)

2. DATA FILES.

C-DF1 CONTROL UNIT REPORT STRUCTURE

SUMMARY: a. This is a transportation control unit reporting structure. Every unit of any type that can request transportation must have a control unit to report to. A requesting unit can report to itself (e.g., maneuver unit with its own trucks) or it can report to a higher echelon control unit (e.g., division movement control officer (MCO)).

b. These data should be preprocessed and the report relationships set up automatically. The default should be that each unit report first to division MCO, then to the movement control center (MCC), then to the theater army MCC. The TA MCC can control any transportation assets outside of corps. The preprocessor must have override capability.

c. Each unit should have a state vector attribute that identifies its transportation control unit.

d. Each control unit must have a separate state vector attribute to identify its next control unit.

e. Two separate attributes for c and d are necessary so that a customer can be its own control unit.

DATA USER: F-DIRECT-RQST (C-F2)

C-DF2 MAXIMUM REQUEST LIFE

SUMMARY: This provides the maximum time a request can be in one place without being processed. After that time has elapsed, a decision is made about what to do with the request. The request life defines the maximum time a request can exist at a controller and at a transportation supplier.

DATA USER: F-TCONTROL (C-F3)
F-TSUPPLIER (C-F4)

PARAMETERS: Request processor type:
(controller or transportation supplier)
Request processor echelon
Support type

RESPONSE: Any time considered the maximum time before a decision is made about the request (0-999999)

C-DF3 HAULING CAPACITY

SUMMARY: This provides the hauling capacity of each vehicle and aircraft. Any vehicle or aircraft that will be used by the transportation model must be included here. The capacity must be given in both volume and weight; gallons for liquid. The unit of measure can be in any measurement as long as it matches file C-DF4 for each side (Blue or Red).

DATA USER:

F-TCONTROL (C-F3)
F-TSUPPLIER (C-F4)

PARAMETERS:

Vehicle type
Commodity liquid or solid

RESPONSE:

Solid: Volume in cubic meters or feet
Weight in short tons (STONS)
Liquid: Volume in gallons
Weight in STONS

C-DF4 COMMODITY MEASURE

SUMMARY: This provides the capacity needed to haul each commodity. The commodity must be defined in the same terms as it is ordered in (e.g., rounds, bladders). The size must be given in both weight and volume. NOTE: The unit of measures between C-DF4 and C-DF3 must match for each side (Blue and Red).

DATA USER: F-TCONTROL (C-F3)
F-TSUPPLIER (C-F4)

PARAMETERS: Commodity type

RESPONSE: For each commodity:
Weight in STONS
Volume in cubic meters or feet or gallons

C-DF5 TRAVEL TYPE

SUMMARY: This defines whether an implicit or explicit transportation unit should be created. If an explicit unit is to be created, this defines whether implicit or explicit travel will be used.

DATA USER:

F-TCONTROL	(C-F3)
F-TSUPPLIER	(C-F4)

PARAMETERS:

Transportation type (air or ground)
Origination point (parent unit) echelon
Destination point (customer) echelon

RESPONSE:

Implicit transportation	
Explicit transporter	implicit travel
Explicit transporter	explicit transporter

C-DF6 IMPLICIT MOVE RATE

SUMMARY: This is used in the computation to determine implicit travel time. Because ground units will NOT check conditions along a route, some preassumed conditions must be established when defining the implicit movement rate data. Every vehicle and aircraft type that can be used as a transporter must be defined in this table.

DATA USER: F-GND-IMP-TRAVEL (C-F7)
F-AIR-IMP-TRAVEL (C-F8)

PARAMETERS: Vehicle type
Environmental conditions:
- o Day/Night
- o Summer/Winter
- o Dry/Rain or Snow

RESPONSE: Movement rate in meters per minute.

C-DF7 PM DATA

SUMMARY: This is used to determine the delay between the time a vehicle/aircraft arrives back at its parent unit and the time it will be available for service. This delay should include all preventive maintenance (PM) time, refueling time, etc.

DATA USER: F-TRANSP-PM (C-F12)

PARAMETERS: Vehicle type

RESPONSE: PM delay time

C-DF8 MINIMUM TRANSPORT SIZE

SUMMARY: This defines the minimum size for a convoy of ground vehicles and for a flight of aircraft. This is especially important in a fractional damage model like CORDIVEM in order to avoid small fractions of transporters moving on the battlefield.

DATA USER: F-SPLIT-CK (C-F13)

PARAMETERS: Transport type (ground or air)
Echelon of parent unit

RESPONSE: Minimum transporter size (0-9999)

NOTE: The designers see no reason to ever have the minimum at any echelon less than 1.

C-DF9 IMPLICIT UNIT

SUMMARY: This will be a temporary file. When an implicit unit is created, an entire explicit unit record is not needed. This smaller record can be passed and treated in much the same way as an explicit unit record. It will be smaller and easy to create and delete.

DATA USER: Most transportation units

DATA ENTRIES:

Unit record ID	Customer ID
Supplier ID	Current location
Transportation supplior ID (Parent)	
Objective unit	Objective location
Vehicle type	Load type, quantity

Mission status:

- 0 = at parent ready for mission
- 1 = at supplier
- 2 = at customer
- 3 = at parent with mission complete

C-DF10 IMPLICIT STATIONARY DATA

SUMMARY: This is used in the computation to determine implicit transporation time. Implicit transportation is the most aggregated form of materiel and personnel movement. No detailed load/unload time or administration time will be considered. This allows the user to input constant times so that it will be considered. This time is added to the move time.

DATA USER: F-SCHED-IMP-TRANSP (C-F12)

PARAMETERS: Ground or air transporter
Starting point (parent, supplier, customer)

RESPONSE: Time to account for stationary time (e.g., load time) (0-99999) in minutes.

C-DF11 T-SUPPLIER C2 TIME

SUMMARY: This defines a command and control delay time at the transportation supplier unit. The time accounts for the time not explicitly modeled such as coordination time within a unit, time to decide what vehicles to use, and time to get the vehicles together at a debarkation point.

DATA USER: F-TSUPPLIER (C-F4)

PARAMETERS: Transportation supplier types (e.g., truck, helicopter)
Echelon

RESPONSE: C2 delay time (0 to 9999) in minutes

C-DF12 CONTROL C2 TIME

SUMMARY: This defines a command and control delay time at the transportation control unit. The time accounts for the time not explicitly modeled such as coordination time within a command center, time to make a decision, and time to communicate the decision within an echelon. This should only account for communication within an echelon. Communcation between echelons is through the Commo module.

DATA USER: F-TCONTROL (C-F3)

PARAMETERS: Transportation controller echelon

RESPONSE: C2 delay time (0 to 9999) in minutes

D-DF1 SCHEDULED SUPPLY CHECK

SUMMARY: a. This file lists the units which have one or more of their RO supply types checked on a scheduled basis.

b. These data should be preprocessed and the support relationships set up automatically. During the play of the game, lists are maintained by priority changes. They include new units added to the list, dead units taken off the list, changes in support relationships, etc.

c. Each unit has a list of suppliers to which it sends its supply requirements. In some cases (e.g., ammo), this means breaking the supply requirements into more than one order because the unit's suppliers each provide different items of the supply type in the unit's basic load.

DATA USER:	F-RO-RQMT	(D-F1)
PARAMETERS:	Side	Unit type (SRC)
	RO supply type	Scheduled time

RESPONSE: List of units in required order

D-DF2 SCHEDULED SUPPLY CHECK TIMES

SUMMARY: This file specifies the times of units that have RO supply types checked on a scheduled basis. See SCHEDULED SUPPLY CHECK (D-DF1).

DATA USER: F-RO-RQMT (D-F1)

PARAMETERS:

Side	Unit type (SRC)
RO supply type	Current game time

RESPONSE: Schedule time for a particular group of units to be checked.

D-DF3 SYSTEM FUEL CONSUMPTION

SUMMARY: a. This data file gives the fuel type and consumption rate of a system operating in a unit type (SRC) performing a specific operation type (OPCODE).

b. This file also provides the data for nonplayed fuelburning systems. This accounts for the fuel consumption for systems found in the TOE of a unit that are never specifically played in the model, such as generators. The amount obtained from the data file is for the unit at 100 percent of its table of organization and equipment (TOE) strength. This is altered in the function by the unit's level of system effectiveness.

DATA USER: F-FUEL-USED (D-F2)

PARAMETERS: Side Unit type (SRC)
OPCODE System ID

RESPONSE: Consumption rate in quantity/hour. The measurements must be consistent with the other fuel measures used in the force, including, system fuel tank and storage facilities capacities.

D-DF4 RESUPPLY THRESHOLDS

SUMMARY: This file provides the threshold level, in fractional form (0.0 - 1.00), to which a unit's current supply status for any supply type is compared. The unit's current status is the fraction of the unit's requisition objective (RO) amount that is currently available or due-in. There are three threshold levels: one for the reorder point, one for the critical point, and one for the emergency resupply point. All RO supply types need at least the reorder threshold. A set of thresholds is needed for each supply type, unit type (SRC), and MSNCODE. Default tables will be provided before preprocessing. These can be changed by the gamer in preprocessing or during the running of the game. (Note: Decision tables can replace the threshold logic that is in the design).

DATA USER: F-RO-SUPPLYCK (D-F3)

PARAMETERS: Side; Unit type (SRC); RO supply type; MSNCODE

RESPONSE:
Reorder threshold (0.0 to 1.0)
Critical threshold (0.0 to 1.0)
Emergency threshold (0.0 to 1.0)

D-DF5 SUPPLY TYPE CHARACTERISTICS

SUMMARY: This file provides information on several supply type characteristics. These data generally apply to all items of the supply type and are often fractions or flags.

DATA USER:

F-RO-SUPPLYCK	(D-F3)
F-LIFT-JOB	(D-F16)
F-ARRIVE-CUSTOMER	(D-F17)

PARAMETERS:
Supply type
Current unit type (SRC)
Echelon of current unit

RESPONSE: RO flag   Tailgate flag
Fraction ALOC arriving at unit SRC
Fraction throughput to unit SRC
(Note: This includes pipeline/barge delivery)

D-DF6 SUPPLY ITEM CHARACTERISTICS

SUMMARY: This file provides information peculiar to various supply type items. Some of the data are in terms of the total amount of an item or the weight of an item; others are flags indicating special treatment.

DATA USER:

F-RO-SUPPLYCK	(D-F3)
F-ALLOC-ORDER	(D-F14)
F-ARRIVE-CUSTOMER	(D-F17)

PARAMETERS: War state (peace, transition to war, or war)
Side Supply type
Item ID

RESPONSE: Total amount (less ALOC) arriving in theater this day
Total amount of ALOC arriving in theater this day
Weight of item (STONS)
Storage requirement per item (Gals, Ltrs, CuFt, etc.)

D-DF7 SUPPLY ITEM FORECASTS

SUMMARY: This file provides the amount of a supply type item that should be added (if any) to a unit's regular order to account for an assigned mission beginning in the near future.

DATA USER:	F-RO-SUPPLYCK	(D-F3)
PARAMETERS:	Side	Unit type (SRC)
	RO supply type	Item ID
	MSNCODE	

RESPONSE: Total additional amount required per day of the item

D-DF8 SUPPLY PLANNING FACTORS

SUMMARY: This file contains the planning factor for determining how much PF supply type is alloted to or consummed by a unit, based on the personnel available.

DATA USER: F-PF-RQMT (D-F5)

PARAMETERS:

Side	Supply type
Unit type	MOPP posture OPCODE
Contamination level	

RESPONSE: Weight amount/man/day

D-DF9 SUPPLY PLANNING FACTOR SCHEDULE

SUMMARY: This file contains the time schedule for the PF supply type consumption and appraisal occurances. The times are not game clock times but daily time schedules based on the 24-hour clock.

DATA USER: F-PF-RQMT (D-FS)

PARAMETERS: Side Supply type.

RESPONSE: Time of next occurrence.

D-DF10 SPECIAL SUPPLY ORDERS

SUMMARY: a. This file contains the information about any special job supply orders that are set up by the gamer/user before or during the game or that are requested by a unit during the game.

b. The special supply orders are those that are required to provide supplies for special jobs not ordinarily expected by a unit or those for which adequate supplies are not usually available. For example, the mines needed by an engineering unit to lay a minefield. The mines require too much cargo space to be carried as part of a unit's regular inventory.

c. This file is also used for setting up one or more shipments from one supplier unit to a receiver unit which can be either specified in detail or based on a planning factor (e.g., surviving systems or on-hand personnel). The shipments can be sent on a regularly scheduled basis or on any specified periodic basis.

DATA USER:	F-JF-FCMT	(D-F6)
PARAMETERS:	Side	Order number
RESPONSE:	SUPPLY CUSTOMER ID	SUPPLIER ID
	Order list	Schedule time
	Repetitions	

D-DF11 WSRO MEI AMMO/FUEL BASIC LOADS

SUMMARY: This file contains the amount of each ammunition/fuel item contained in a weapon system replacement objective (WSRO) major-end-item (MEI) basic load. (Note: This is not necessarily the same as the item-to-system relationship that exists in CORDIVEM. For instance, a unit's basic load of an ammunition type used by several different systems may be determined during preprocessing by multiplying the number of each system using it in the unit by the system's basic load size and adding them together. However, a basic load would not be issued to the system.)

DATA USER:	F-WSRO-SPLY-RQD	(D-F8)
	F-SHIP-AVAIL	(D-10)
	F-ALLOC-ORDER	(D-14)

PARAMETERS: Side MEI ID

RESPONSE: (Supply type, item#, amount)* in MEI types BL

D-DF12 SUBSTITUTES FOR SUPPLY ITEMS

SUMMARY: This file contains any assigned substitutes for supply items. If the supply item originally required by the unit is not available or the SUPPLY CUSTOMER has surpassed its controlled allotment, then substitutes are looked for.

DATA USER: F-SUPPLY-ROST (D-F11)

PARAMETERS: Side Supply ID
Supply item ID

RESPONSE: Substitute supply item ID

E-DF1 SYSTEM/CREW TABLE

SUMMARY: The weapon system/task crew table consists of mappings of weapon systems and personnel categories. For each system, the full crew and minimum crew sizes are provided for each personnel type involved. It is currently assumed that there can be at most two types of personnel associated with any one system type.

DATA USER:

F-PEREP	(E-F1)
F-CALPER	(E-F6)
F-CHINV	(E-F4)
F-SRRCRU	(E-F12)

PARAMETERS: Weapon system ID
Max or Min indicator (full or min crew sizes).

RESPONSE: Returning values would consist of the category and the number of each personnel category required for a single crew of the specified system.

E-DF2 R-POOL LIST

SUMMARY: A list of the R-POOL unit IDs is to be set up in the order in which they are to be evaluated (lowest echelon to highest, etc).

DATA USER: F-PEREP (E-F1)

PARAMETERS: None

RESPONSE: When F-PEREP begins, the list is obtained and the R-POOL unit IDs are referenced in order.

E-DF3 DISTRIBUTION POINTS

SUMMARY: The distribution points are units to which convoys will deliver personnel. For example, the brigade headquarters for a group of battalions will be their distribution point. Because each distribution point will be a defined unit in the game, the table will consist of a mapping of customer unit IDs to distribution point unit IDs.

DATA USER: F-PEREP (E-F1)

PARAMETERS: Customer unit ID

RESPONSE: The distribution point ID is returned.

E-DF4 SUBSTITUTION TABLE

SUMMARY: The substitution table contains all of the acceptable alternative categories for each category of personnel used in the game. One suggested format would be a square matrix with each row/column being a category of personnel. The entries would indicate whether the column category was a substitute for the row category. Another format would be a list of linked lists. With either arrangement, one-way substitutions would be permitted.

DATA_USER: F-LOCPER (E-F13)

PARAMETER: Personnel category needing a substitute.

RESPONSE: Returning value would be either an appropriate substitute category or a NIL (negative) response.

E-DF5 ALLOCATION TABLE

SUMMARY: The allocation table contains the target weapon effectiveness levels for every unit in the game. The target levels represent the level of weapon effectiveness that should be attained if 100% weapon effectiveness cannot be reached. The table values can be changed by gamer intervention.

DATA USER: F-ALLPER (E-F1)

PARAMETERS: Unit ID Unit opcode
Unit function code

RESPONSE: Allocation percentage

E-DF6 STANDARD INVENTORY

SUMMARY: The personnel inventories of units which are not evaluated in terms of weapon effectiveness, such as replacement pools (R-POOLs), medical units, and maintenance units, are compared with a default inventory when it is necessary to determine what replacements they require. The inventory should consist of a mapping of required tasks and required personnel (by number and by category). If one category of personnel can be used for more than one task, the total number of personnel in the category should be provided. The inventory (quantities and categories) can be adjusted by gamer intervention.

DATA USER: F-PEREP (E-F1)

PARAMETERS: Unit ID Unit opcode

RESPONSE: Personnel categories and quantities

E-DF7 DEMAND GROUP (R-POOL Demand, Accumulated Demand, Theater Queue)

SUMMARY: The R-POOL demand represents the personnel requests against the R-POOL during the current time period. The customer shortfalls and the WSRO RQSTS which have occurred during the period are accumulated to show the number in each category requested, whether they were supplied or not.

The accumulated demand (ACC-Demand) is created during F-PEREP. Following the evaluation of each R-POOL and the assignment of its personnel, the R-POOL demand is added into the accumulated demand. When all R-POOLs of an echelon have been evaluated, the ACC-Demand will represent the total personnel requirement of that echelon for the current period. At the end of the cycle, the total personnel requirement for the corps will be available. It will be stored in the theater queue to be used as a future personnel allotment.

The theater queue (T-Queue) will be a first-in-first-out (FIFO) queue representing the personnel allotments arriving at the theater for distribution to the corps. At the startof the game, the T-Queue will be filled with estimated allotments. The uppermost entry in the queue will be popped off when a corps allotment is due and the new ACC-Demand will be added to the end of the queue. TheT-Queue will hold enough entries to simulate the length of time needed for personnel requested in reponse to requirements to arrive (e.g., five entries will be needed if it takes five days for the replacements requested (i.e., the demand) to arrive at the front).

DATA USER:

F-PEREP	(E-F1)
F-OLWSR	(E-F8)
F-NUWSR	(E-F7)
F-FILLWS	(E-F9)
F-CHKCUS	(E-F11)
F-SUPPER	(E-F10)

DATA ENTRIES: Personnel category Personnel quantity (i.e., the number of each personnel category required.)

E-DF8 W-QUEUE

SUMMARY: The W-Queue is the assignment structure associated with each R-POOL. When replacements are assigned, an assignment (ASSGN) is created which groups the replacements according to the distribution points involved (i.e., the personnel are assigned to P-CUSTOMER units; the P-CUSTOMER units are grouped according to their distribution points; the personnel assigned to P-CUSTOMERs with the same distribution point will be an ASSGN). The W-Queue will hold the ASSGN until it can be transferred to either the distribution point or a transporter.

DATA USER:

F-PEREP	(E-F1)
F-ALLPER	(E-F5)
F-CALPER	(E-F6)

DATA ENTRIES:

Assgn ID	Distribution point ID
Customer IDs	Customer shortfall
Distribution total	Delay time
Mode of transportation	
Allocated personnel	(each customer's, by category)

E-DF9 WSR-QUEUE

SUMMARY: The WSR-Queue is associated with each R-POOL and is used to hold the WSRO personnel crews while they are being built and until they are sent for. When supply issues a RQST, the RQST is entered into the appropriate WSR-Queue and remains there until either the crews are supplied or the RQST is cancelled.

DATA USERS:

F-WSRO	(E-F2)
F-NUWSR	(E-F7)
F-OLWSR	(E-F8)
F-FILLWS	(E-F9)
F-ARRCRU	(E-F12)
F-SUPPER	(E-F10)
F-CHKCUS	(E-F11)
F-CALPER	(E-F6)

DATA ENTRIES:

RQST ID	Customer ID
Systems required	Personnel allocated
Personnel required	Personnel assigned
Crews available	

E-DF10 RQMT

SUMMARY: The requirement (RQMT) is a temporary array created to hold the customer and total personnel requirements (shortfalls) and the personnel assigned from the R-POOL during the replacement process (F-PEREP). The total customer shortages in each personnel category are determined and the personnel to meet this demand are removed from the R-POOL inventory and placed in the RQMT. Later, when all categories have been accounted for, the personnel will be removed from the RQMT, allocated to the individual customers, and placed into the W-Queue.

DATA USER:

F-PEREP	(E-F1)
F-CHINV	(E-F4)
F-ALLPER	(E-F5)
F-CALPER	(E-F6)

DATA ENTRIES:

Customer IDs ASSGN ID
Customer requirements (shortfall)
Total requirement (total shortfall)
Assigned personnel (by category)

E-DF11 T-QUEUE CEILINGS

SUMMARY: The T-QUEUE ceilings are the maximum quantities for each category of personnel replacements arriving at the theater for distribution. The values can either consist of one quantity for each category or graduated quantities for each category based on the day of the game and type of battle. The quantities of each category in the T-QUEUE are compared to the appropriate value in the accumulated demand and the minimum is selected for inclusion in the T-QUEUE.

DATA USER: F-PEREP (E-F1)

PARAMETERS: If using a constant for each category:
Personnel category
If using the graduated option:
Personnel category battle type
Day of the game

RESPONSE: Personnel category quantity

F-DF1 DAILY AVAILABLE RESOURCE HOURS

SUMMARY: This information is about resource types (systems and/or personnel) used in repair (i.e., a referenced resource type on Repair-Job-template see F-DF11).

For every unit where resource types exist and can be utilized in repair actions, a value must be entered for each resource type that represents the number of hours in a 24-hour day that the resource type could be utilized for repair work if the unit is in a normal operational mode. If the resource type simulated is materiel, then the value might be 24; if it is personnel, it would be less than 24 to account for sleep periods and nonproductive time.

The resource allocator uses this factor to determine the average resource hours available in a time increment. If the daily available resource hours (DARH) for resource type (RT) A in unit XYZ is 12, and the on-hand strength of A in unit XYZ is 6, then for a 1-hour time increment the resource hours available (RH-Avail) for RT A is calculated as

RH-Avail (RT) = (6 * 12) / (24 / 1) = 3

which will be further adjusted if the unit is in other than normal operational mode (e.g., moving, under attack, etc.) See F-REP-RES-ALLOC (F-F1).

To get the effect of working shifts, this factor can be changed over simulated time to obtain the effect (e.g., for a single 12-hour shift, set the factor to 24 at the beginning of the shift and to 0 at the end of the shift).

DATA USER: F-REP-RES-ALLOC (F-F1)
F-HOLD-MOVE-ASSESS (F-F2)

PARAMETERS: Unit ID
Resource type

RESPONSE: Resource-hours

F-DF2 RESOURCE TYPE SUBSTITUTES

SUMMARY: This defines which resource types, if any, are substitutable.

As an example of substitutability, one type of powertrain mechanic, type A, can work on self-propelled artillery, M60s, and APC; another powertrain mechanic, type B, is trained to work on M1s but can also substitute for a type A; another powertrain mechanic, type C, is trained to work on an IFV but can also substitute for a type A; and lastly, a powertrain mechanic type D is trained to work on wheeled vehicles. The substitutability data would look like the following:

Resource Type	Substitute
A	B
A	C
B	-
C	-
D	-

DATA USER: F-REP-RES-ALLOC (F-F1)
F-HOLD/MOVE-ASSESS (F-F2)

PARAMETERS: Resource type.

RESPONSE: Resource type substitutes

F-DF3 PERSONNEL/VICTIM-TYPE-PROBABILITY-TABLE

SUMMARY: This table defines which repair job (RJ) types have been defined for classifying wounded personnel along with the probability of occurance that the victim would be so classified as that type. For example:

RJ Type Classification	Probability	Definition
A	.25	Killed-In-Action (KIA)
B	.08	Patient requires 24-hrs division-level care
C	.08	Patient requires 48-hrs division-level care
D	.09	Patient requires 72-hrs division-level care
E	.05	Patient requires 4 days hospital care
F	.05	Patient requires 5 days hospital care
G	.05	Patient requires 6 days hospital care
H	.05	Patient requires 7 days hospital care
I	.05	Patient requires 7+ days hospital care
J	.25	Patient requires 12-hrs unit-level care

Unlike the probability table for nonpersonnel, there are no parameters for the type of personnel wounded or the munition type causing the wound. If statistically significant data could be developed that classifies patients into differing RJ types (see F-DF12) based upon any parameters, then this table and function F-F3 would have to be modified to use such a parameter.

DATA USER: F-TRANSFORM (F-F3)

PARAMETERS: None

RESPONSE: RJ-type classifications with corresponding probabilities

F-DF4 **SYSTEM-TYPE/ROUND-TYPE/VICTIM-TYPE/PROBABILITY TABLE**

SUMMARY: This table identifies which repair job types will be used to classify combat damaged systems and provides the probability of occurance for each one as a function of the damaged system-type and the first round-type causing the damage.

This table is applied to the attrition counts and specifies the extent to which jobs are repairable. For repairable jobs, it specifies the repair time, the resources required, and the extent to which recovery and evacuation resources would be required.

The application of this information provides:

o workloads to supply and transportation to replace the catastrophic and GS losses;

o workloads to the recovery system which, if overwhelmed, can lead to some further losses under hostile conditions or add recovery queueing time to the repair turnaround time;

o workloads to the maintenance organizations which can add queueing time to the repair turnaround time and increase evacuation requirements to avoid queueing problems in forward areas .

The data in this table should be consistent with the data and assumptions used by the attrition methodology. It should also consider damage and survivability beyond the first hit. It should be based on the expected conditions up to the point of recovery or the end of the engagement. F-BATTLE-EFFECTS will assess further losses to unrecovered recoverable systems when a unit has subsequent engagements.

DATA USER: F-TRANSFORM (F-F3)

PARAMETERS: System-type Round-type (of first hit)

RESPONSE: RJ-type classification Probability

Note: it is imperative that the developer of this table and the associated repair-job-type-templates understand the data assumptions and attrition methodology in the model as well as such data sources as single hit shotline data, SPARC methodology, multiple-hit output data and attrition methodology, and the maintenance MARC methodology used in high-resolution models such as CASTFOREM.

F-DF5 RJ TYPE CLASSES

SUMMARY: This table defines classes of repair job types so that certain actions unique to each class can be performed. The classes and effects of each are:

Class	Reason
Personnel KIA	Will generate immediate personnel replacement actions; will quantify workload for graves; will remove KIA from the recovery repair system.
Catastrophic System	Will generate immediate supply system replacement.
GS Maint and Hospital	Will generate immediate equipment and bound patients personnel replacements.

DATA USER: F-TRANSFORM (F-F3)
F-RAM/DNBI-INIT (F-F4)

PARAMETERS: Class (defined above)

RESPONSE: RJ-type

F-DF6 SYSTEM-TYPE/RAM-DNBI-TYPE-PROBABILITY-TABLE

SUMMARY: This table identifies which repair job types have been defined for classifying RAM-DNBI job types along with the probability of occurance for each type. The probability of occurance is a function of the system type, unit type, and unit posture for materiel; and system type and unit type for personnel.

This information is used to specify the rate at which DNBI and failures occur, the repair time and resources required, and the extent to which recovery and evacuation resources are required.

The effect is to:

o Provide workloads to supply, personnel, and transportation to replace the GS and hospital-bound losses;

o Provide workloads to the materiel recovery system which, if overwhelming, can lead to some further losses under hostile conditions or add recovery queueing time to the repair turnaround time.

o Provide workloads to the maintenance organizations which, when exceeding capability, will add additional queueing time to the repair turnaround time and possibly additional evacuation requirements to avoid queueing problems in forward areas.

o Specify RAM rates using system type, unit type, and unit activity as parameters to allow for consistency with the data and methodology in the maintenance MARC process.

DATA USER: F-RAM/DNBI-INIT (F-F4)

PARAMETERS: System-type Unit-type
Unit-posture (if System-type is materiel)

F-DF7 RECOVERY VEHICLE TABLE

SUMMARY: This table defines which systems in the game are recovery systems.

DATA USER: F-RECOVERY (F-F6)

PARAMETERS: None

RESPONSE: System-type

F-DF8 DAILY-AVAILABLE-RECOVERY-VEHICLE-RESOURCE-HOURS

SUMMARY: This table defines the number of hours in a 24-hour day that each recovery vehicle type in a unit could be utilized for recovery work, assuming the RV is crewed.

The F-RECOVERY function (F-F6) uses this factor to determine the average recovery hours available in a time increment. The formula for computation of recovery capability is given in F-F6 and explicitly considers only these data and recovery vehicles, not crews. This table can be gamer manipulated to account for crew availability. For example, one can set recovery vehicles available for 24 hours if two crews were present per vehicle each working 12-hour shifts; or, if one crew per vehicle is available, set it to 24-hour availability to obtain maximum support until utilization was too high for too long at which point the availability factor can be set lower to reflect the requirement for crew rest.

DATA USER: F-RECOVERY (F-F6)

PARAMETERS: Unit ID
Recovery-vehicle-type (subset of system types)

RESPONSE: Resource-hours

F-DF9 LIKE RECOVERY SYSTEMS

SUMMARY: This defines which systems in the game that are not recovery systems but could be used for like system recovery, if needed.

DATA USER: F-RECOVERY (F-F6)

PARAMETERS: None

RESPONSE: System-types

F-DF10 REPAIR JOB RECOVERY VEHICLE HOURS REQUIREMENT

SUMMARY: This defines the average time (in hours) required to recover a nonmobile system both from the field into the unit repair site and between repair sites.

The parameters used are the RJ-type, RJ-origin, and RJ-destination. The data must reflect round-trip travel times as well as hookup and drop times. Field recovery is indicated when RJ-origin and RJ-destination are set the same, but the associated time allows for unit-unique area dispersion and the resulting average field recovery distances and travel time requirements. It also allows for definition of unit-unique geographical separation from support units and the resulting average recovery distance and travel time requirements. The RJ-type parameters can be used to reflect system-type variations in hookup and drop times as well as a relative location of the system type in a unit and the corresponding recovery times.

DATA USER:

F-RECOVERY	(F-F6)
F-RECOVERY-SUPPORT	(F-F7)
F-RECOVERY-SHORT	(F-F8)

PARAMETERS: RJ-type

RESPONSE: Recovery-vehicle-hours-required

F-DF11 REPAIR JOB TEMPLATE

SUMMARY: This template defines the various types of repair jobs to be modeled in the simulation. Each repair-job type uniquely defines the sequence of repair actions which must be performed before the system can be returned in an operational state. Each repair action defines the time, and the type and quantity of resources required. The defined quantities are associated with one whole system; but, because fractional quantities are played in the model, the functions that use these data will multiply the amounts by the actual fractional quantities of the created repair job (RJ) entities.

Each data element or attribute of a repair job template is discussed below:

o RJ-type - is used to uniquely identify the different repair job types (and templates) modeled. It also serves as a key to this and other tables.

o System-type - identifies the system type if RJ-type is a system; if it is personnel, the personnel type will be supplied by the personnel module.

o Current-RA - a pointer initialized to the first RA in the RA list.

o Ex-Parts-Avail (PT) list - Exchange-Parts-Available (Part Type) lists the quantities by part type of operational parts on the system type that could possibly be removed for use in repairing another system. Note: this would not be appropriate for personnel.

o Mobility-flag - defines whether the repair job will be able to self-recover or not.

o Personnel-RJ-flag - indicates whether the repair-job is for personnel or not.

F-DF11 REPAIR JOB TEMPLATE (cont.)

For each Repair action (RA) required:

o RA-type - Repair-action-type is used to uniquely identify the repair action described. It also serves as an identifier and key in other command and control tables.

o RA-time-remaining - defines the expected value (average) time required to complete the repair action once it is started. If no RT or PT requirements are specified, then no queueing (waiting) would occur for those resources and the RA-time would be the only constraint.

o Critical/Fatal-RA-Start-time - for use by personnel type RJ only and specifies the elapsed time from initial injury by which the RA must be started or else the patient dies.

o RH-Req (RT) list - Resource-Hour-Requirements resource type defines the resource-hour (RH) requirements by each resource type (RT) required to accomplish the repair action. The determination of what RT to play is discussed in the chapter narrative. These requirements can be optional if no queueing is expected due to resource constraints.

o Parts-Req (PT) list - Parts-Requirement part type defines the quantities of parts by each part type (PT) required to accomplish the repair action. The determination of how to define and play parts is discussed in the chapter narrative. These requirements can be optional if no queueing is expected due to inventory shortfalls and no significant supply/transportation replacement requirement is generated.

DATA USER:	A-CREATE-RJ	(F-A1)
	A-PASSBACK-RJ	(F-A2)
	A-COMBINE-RJ	(F-A3)
	A-CONTAMIN-RJ	(F-A4)
	A-ABANDON-RJ	(F-A12)

PARAMETERS: RJ-type

RESPONSE: RJ-template (see above discussion)

F-DF12 UNIT ASSETS

SUMMARY: Because recovery and repair of systems and personnel are dependent upon recovery systems, resource types and parts type, it is important that careful consideration be given to the initialization of the game's unit asset data. One could start with TOE information, but it should be modified to reflect the resource types specified in RJ-template. If, for instance, repair actions are authorized/desired for a repair site, then the asset types should be there also. If dedicated forward support is provided by teams, then the team assets must be included in the forward repair site unit assets for them to be properly utilized. (This is not true data-file information but is listed here as a reminder of data preparation requirements.)

DATA USER: Model

PARAMETERS: N/A

RESPONSE: N/A

F-DF13 REC EVAC CAPABILITIES

SUMMARY: This defines the quantity of an RJ-type that a recovery/evac system can move.

DATA USER: F-EVAC-MANAGER (F-F11)

PARAMETERS: System-type of recovery/evac system
System/personnel-type of RJ

RESPONSE: Capability quantity

F-DF14 RJ LOAD/UNLOAD TIME

SUMMARY: This defines the time it takes to load and unload an RJ-type. If there is any variation among evac system types, an average should be entered.

DATA USER: F-EVAC-MANAGER

PARAMETERS: RJ-type

RESPONSE: Time

G-DF1 DECON MAXIMUM SHIFT TIME

SUMMARY: This is a constant number indicating how long (in hours) any DECON-UNIT can work constantly without rest in a 24-hour period.

DATA USER: F-DECISION (G-F1)

PARAMETERS: None

RESPONSE: One time will be furnished for all DECON-UNITs (a constant hour number between 0 and 24 hours).

G-DF2 DECON-UNIT REPORT STRUCTURE

SUMMARY: a. This is a decontamination control unit reporting structure. Any unit of any type that can request decon must have a control unit to report to. A requesting unit can report to itself (e.g., maneuver unit) or it can report to a higher echelon control unit (e.g., division chemical officer).

b. These data should be preprocessed and the report relationships set up automatically. The default report relationship should have each unit report first to the brigade chemical officer, then to the division chemical officer. The preprocessor must have override capability.

c. Each unit should have a state vector attribute that identifies its decon control unit.

d. Each control unit must have a separate state vector attribute to identify its next control unit.

e. Two separate state vector attributes are necessary for c and d, so that a customer can be its own control unit.

DATA USER: F-DECISION (G-F1)

G-DF3 <u>CONTAMINATION LIFE TABLE</u>

<u>SUMMARY:</u> This table consists of the hazard type and lifetime of any contaminant which can be used against a particular customer. The lifetime is the length of time that the hazard will remain persistent.

<u>DATA USER:</u> F-DECON-AVAIL (G-F2)

<u>PARAMETERS:</u> Customer ID Hazard type
Time customer was contaminated

RESPONSE: Lifetime of hazard (length in hours)

G-DF4 DETACHMENT PERCENTAGE TABLE

SUMMARY: This table gives the detachment percentage for a particular customer unit type and opcode. It also gives the detached unit the new customer unit ID.

DATA USER: F-PREPARE (G-F3)

PARAMETERS: Customer unit ID

RESPONSE: New customer unit ID Percentage of detachment

G-DF5 SYSTEM TYPE QUANTITY

SUMMARY: This provides the detachment percentage for each of the different system types. The system types consist of personnel, supplies, and various equipment types identified for a particular type of customer.

DATA USER: F-DECON (G-F6)

PARAMETERS: Customer unit ID Detachment percentage
System type

RESPONSE: Customer unit ID New customer unit ID
Detach percentage of each system type

G-DF6 DECON SETUP TIME

SUMMARY: This provides the constant setup time that a DECON-UNIT takes to get a site ready for the decontamination process.

DATA USER: F-DECON-ATOBJ (G-F5)

PARAMETERS: None

RESPONSE: A constant time period will be provided for all DECON-UNITs.

G-DF7 DECON PROCESS TIME

SUMMARY: This provides the time it takes a team to decon a vehicle or weapon system. It is used to compute the decon process time. The length of time required for the decon process will be a function of the customer's size and the availability of equipment and supplies. (The total amount of equipment and supplies required for the job will be calculated and the job time determined; additional delays to wait for supplies and equipment and to rest will be added in as necessary.)

DATA USER: F-DECON (G-F6)

PARAMETERS: System type: personnel
equipment
supplies

RESPONSE: A length of time (in hours). Constant decon periods will be provided for equipment, for supplies, for personnel.

6-DF8 DECON CLEANUP TIME

SUMMARY: This provides the variable cleanup time that a DECON-UNIT requires to clean up a site after decontaminating a customer. The cleanup time is a function of the amount of equipment and type of unit that was deconned.

DATA USER: F-DONE-DECON (6-F7)

PARAMETERS: Customer unit type Customer equipment type Customer equipment quantity

RESPONSE: The length of time needed to clean up the site.

APPENDIX K

COMMAND AND CONTROL DATA REQUIREMENTS

1. DATA FILE CROSS-REFERENCE.

REF	NAME	USER	
C-CC1	TASK PROCESSING	F-TCONTROL	(C-F3)
C-CC2	SUPPORT UNIT PRIORITY	F-TCONTROL	(C-F3)
C-CC3	TASK SPLIT	F-TCONTROL	(C-F3)
C-CC4	REQUEST PRIORITY	F-DIRECT-RQST	(C-F2)
C-CC5	SUPPORT TYPE	F-DIRECT-RQST	(C-F2)
C-CC6	SPLIT DECISION	F-SPLIT-CK	(C-F13)
C-CC7	TRANSP NEXT MOVE	F-TRANSP-DECIDE	(C-F15)
D-CC1	LOST SUPPLY REORDER	F-TU-LOSSES	(D-F13)
D-CC2	LOAD JOB PRIORITY	F-LIFT-JOB	(D-F16)
E-CC1	PERSONNEL CATEGORY PRIORITY	F-PEREP	(E-F1)
E-CC2	DELIVERY DELAY TIME	F-PEREP	(E-F1)
E-CC3	CC-FLAG	F-DISPER	(E-F3)
F-CC1	UNIT-RA-PRIORITY-TABLE	F-REP-RES-ALLOC	(F-F1)
F-CC2	EXCHANGE-PARTS-POLICY	F-HOLD/MOVE-ASSESS	(F-F2)
F-CC3	HOLD-EVAC-TIME-FACTOR	F-HOLD/MOVE-ASSESS	(F-F2)
F-CC4	SUPPORT-UNIT-TABLE	F-HOLD/MOVE-ASSESS	(F-F2)
F-CC5	COMBINING-FLAG	F-TRANSFORM F-BATTLE-EFFECT F-RAM/DNBI-INIT	(F-F3) (F-F5) (F-F4)

REF	NAME	USER	
F-CC6	SUPPORT-CLEARING-STATION	F-TRANSFORM	(F-F3)
F-CC7	RJ-REC-PRIORITY-TABLE	F-RECOVERY F-RECOVERY-SHORT	(F-F6) (F-F8)
F-CC8	RJ-RV-PRIORITIES	F-RECOVERY F-RECOVERY-SUPPORT	(F-F6) (F-F7)
F-CC9	RECOVERY-SUPPORT-UNIT-RELATIONSHIP	F-RECOVERY-SUPPORT	(F-F7)
F-CC10	RECOVERY-SUPPORT-RA-PRIORITY TABLE	F-RECOVERY-SUPPORT	(F-F7)
F-CC11	OPERATIONAL-SYSTEMS-LIKE-RECOVERY-TABLE	F-RECOVERY-SHORT	(F-F8)
F-CC12	OPERATIONAL-SYSTEMS-LIKE-RECOVERY-UTILIZATION-PRIORITY	F-RECOVERY-SHORT	(F-F8)
F-CC13	UNIT-PRIORITY-ALLOCATION-POLICY	F-RTNS-ALLOC	(F-F10)
F-CC14	RJ-EVAC-PRIORITY-TABLE	F-EVAC-MANAGER	(F-F11)
F-CC15	EVAC-UTLILIZATION-PRIORITIES	F-EVAC-MANAGER	(F-F11)
F-CC16	REPAIR-JOB-OWNING-UNIT-ACCOUNTABILITY-TABLE	A-EVACUATE-RJ	(F-A9)
F-CC17	RETURNS-ALLOCATION-PRIORITY-LIST	F-RTNS-ALLOC	(F-F10)
G-CC1	DECON REQUEST ASSIGNMENT	F-DECISION	(G-F1)
G-CC2	DECON TYPE	F-DECISION	(G-F1)
G-CC3	DETACH INSTRUCTIONS	F-PREPARE	(G-F3)
G-CC4	MOVEMENT INSTRUCTIONS	F-PREPARE F-DONE-DECON	(G-F3) (G-F7)

2. COMMAND AND CONTROL DATA.

C-CC1 TASK PROCESSING

SUMMARY: This file is used to determine what to do with a request that is unfilled and on the controller's queue longer than the MAXIMUM REQUEST LIFE (C-DF8).

DATA USER: F-TCONTROL (C-F3)

PARAMETERS: Support type   Request priority
Request processor echelon

RESPONSE: One of the following messages:

- o Drop the request from the queue.
- o Forward the request to the next controller.
- o Continue processing the request.

C-CC2 SUPPORT UNIT PRIORITY

SUMMARY: This is used when more than one support unit is available to fill a transportation request. The possible support units are listed in priority order. The selection will be based upon the unit with the closest range and the most vehicles. This is only an indication of what could be done. As more options are selected, a new selection routine will be added.

DATA USER: F-TCONTROL (C-F3)

PARAMETERS: Echelon of control unit
Support unit type (e.g., TMT, MCC, MANEUVER)

RESPONSE: Support unit ID

C-CC3 TASK SPLIT

SUMMARY: This will tell the controller whether to send the entire task to the support unit and have it queued there or to try to fill it with other supporters. This can occur when a task is being filled by a controller and one transportation supplier cannot fill the entire request.

DATA USER: F-TCONTROL (C-F3)

PARAMETERS: Support type Request priority Echelon of transport supplier

RESPONSE: Split Don't split

C-CC4 REQUEST PRIORITY

SUMMARY: This will be used to assign a priority to each request coming into a control unit. Only control units can set priorities. This simulates such activities as those of the corps movement control center establishing transportation requests.

DATA USER: F-DIRECT-ROST (C-F2)

PARAMETERS:
Customer unit type
Customer unit mission
Customer echelon
Customer supply indicator
Supply type
Supplier echelon
Request type (normal, emergency, allocatio)

RESPONSE: Request priority (1-9)

C-CC5 SUPPORT TYPE

SUMMARY: This is used to determine the type of support a request is to receive. If more than one support type is acceptable, a priority is given to each support type. The control unit makes this determination. A code is always returned for each support option. If the option is not to be used, a 0 is returned. The same priority can be assigned to more than one type.

DATA USER: F-DIRECT-RQST (C-F2)

PARAMETERS:
Control unit echelon
Request priority
Commodity to be transported

RESPONSE: Support types. Return one or more:
- o Airdrop
- o Airlift
- o Ground transport
- o Rolling stock

Priority codes. Return one for each support type:
- o 0 = do not use, most desirable
- o 1 = highest priority
- o 2 = second priority
- o 3 = third priority
- o 4 = fourth priority, least desirable

C-CC6 SPLIT DECISION

SUMMARY: This defines the action to be taken by a ground transport unit or air transport unit after it arrives at a supply point. The supply module triggers the routine that requires this decision.

DATA USER: F-SPLIT-CK (C-F13)

PARAMETERS:
Transport type
Supply class
Last supply point (Y or N)
Amount not filled Minimum for convoy (Y or N)
Supplies availability at supply point (SP):
- o All supplies at SP
- o No supplies at SP
- o Partial supplies at SP

RESPONSE: NO SPLIT:
- o Entire convoy stay and load available
- o Entire convoy abort mission (drop due-in)
- o Entire convoy go to next SP

SPLIT:
- o Part stay to load; part abort (drop due-in)
- o Part stay to load; part go to next SP

C-CC7 TRANSP NEXT MOVE

SUMMARY: This defines the next move for a transporter after the key events of loading and unloading cargo or personnel.

DATA USER: F-TRANSP-DECIDE (C-F15)

PARAMETERS: Transport type (e.g., HET, 5-ton, helicopter)
Current location (i.e., supplier, customer)
Current location echelon
Parent echelon

RESPONSE: The possible responses are:

- o Go to customer
- o Go home
- o Check backhaul file

D-CC1 LOST SUPPLY REORDER

SUMMARY: This file is used to determine whether to immediately reorder the part of a supply order lost due to interdiction of the transporation unit or to reorder at the regular order time.

DATA USER: F-TU-LOSSES (D-F13)

PARAMETERS: Customer unit mission
Customer supply indicator
Request type (normal, emergency, ALLOCATION)
Supply type
Fraction of order lost

RESPONSE: Yes - place order for amount lost
No - wait until next regular order

D-CC2 LOAD JOB PRIORITY

SUMMARY: This file is used to determine whether to reorder the part of a supply order lost due to interdiction of the transporation unit immediately or at the regular order time.

DATA USER: F-LIFT-JOB (D-F16)

PARAMETERS:
- Customer unit type
- Customer unit mission
- Customer echelon
- Customer supply indicator
- Supply type
- Supplier echelon
- Request type (normal, emergency, ALLOCATION)

RESPONSE Job order priority (1-9)

E-CC1 PERSONNEL CATEGORY PRIORITY

SUMMARY: If personnel categories can be substituted for each other (see E-BF4, appendix J), the order in which the category requirements are filled may make a difference in what system and what unit requirements will be met. Which category is supplied first will depend upon the system priorities (e.g., is a tank more important than a truck) and the general combat situation for the customer units. Other parameters will depend upon the types of categories played and the types of substitutes permitted.

DATA USER: F-PEREP (E-F1)

PARAMETERS: Category type System types
Customer's combat situation

RESPONSE: Category priority

E-CC2 DELIVERY DELAY TABLE

SUMMARY: The delay table is used to determine the length of time that an implicit personnel delivery should take.

DATA USER: F-PEREP (E-F1)

PARAMETERS:

Weather	Implied travel type
Time of day	Current travel conditions
R-POOL location	Distribution point location

RESPONSE: The amount of time to schedule (in hours)

E-CC3 CC FLAG

SUMMARY: When personnel arrive at a distribution point, the status of the distribution point and each customer must be checked to determine if the personnel can be received. If not, the CC flag is set. If the unit involved is a distribution point, a new distribution point is located and the convoy redirected. If this cannot be done, the personnel are returned to the R-POOL. If the unit involved is a customer, the allotted personnel are redistributed among the remaining customers at the distribution point or they are returned to the R-POOL. Possible decision factors include the current customer unit status, the unit allocation level, and the battle strategy (e.g., any recent changes in the strategy). For example, if a unit has been wiped out, its status will be 0; if it is to be withdrawn in the near future, its target allocation level may have been reset to 0 to prohibit replacements.

DATA USER: F-DISPER (E-F3)

PARAMETERS: Receiving unit ID (distribution point or customer)

RESPONSE: Possible flag settings:

- o 0 = continue
- o 1 = redistribute
- o 2 = return to R-POOL

F-CC1 UNIT RA PRIORITY TABLE

SUMMARY: This table defines which repair actions (RAs) are authorized for repair at a repair site and the order in which repair jobs (RJs) are allocated resources within a given unit performing repair. If the next RA for an RJ is not in the table, it will be flagged for movement to a support unit. Prioritization is the sole method used in this model in the allocation of scarce resources and therefore it affects the relative queueing and repair cycle times between different RJs. Because of the processing requirements associated with repairing contaminated RJs, the prioritization is actually based on the combination of RA and the contamination status flag.

DATA USER: F-REP-RES-ALLOC (F-F1)
F-HOLD/MOVE-ASSESS (F-F2)

PARAMETERS: Unit ID

RESPONSE: Prioritized list of RA-type and contamination status flag pairs

F-CC2 EXCHANGE PARTS POLICY

SUMMARY: This policy defines unit doctrine/policy for removing operational parts/components/assemblies from damaged systems and using them in the repair of other systems where needed but not in inventory. These data specifically state whether or not exchange is permitted and, if so, whether or not such techniques should be used when considering jobs in the RA-priority sequence or after trying to start all jobs in the RA-priority sequence.

DATA USER: F-REP-RES-ALLOC (F-F1)

PARAMETERS: Unit ID

RESPONSE: Ex-In-Pri-Policy: if true then perform exchange if required for RJ during/in RA priority sequence

Ex-Out-Pri-Policy: if true then perform exchanges if required only after jobs were first processed in RA priority sequence using only parts in normal inventory

If one is true, the other must be false.
If both are false, no exchange is permitted.

F-CC3 HOLD EVAC TIME FACTOR

SUMMARY: This unit-specific factor is used to model the operational policies governing the period of time within which a system must be repaired or else it should be evacuated farther from the front. Because the repair completion time cannot be forecast with certainty since new work with high priorities can arrive after the current set of queued jobs is considered, the factor loaded should perhaps be some value less than the actual operating policy value. For example, if the actual policy is six hrs, perhaps the factor used should be 3 or 4 to allow for higher priority work to arrive in the interim.

DATA USER: F-HOLD/MOVE-ASSESS (F-F2)

PARAMETERS: Unit ID

RESPONSE: Hold-Evac-Time-Factor

F-CC4 SUPPORT UNIT TABLE

SUMMARY: This table defines where an RJ should be evacuated to, given its current repair site.

DATA USER: F-HOLD/MOVE-ASSESS (F-F2)

PARAMETERS: Unit ID
RJ-type

RESPONSE: Support-unit ID

F-CC5 COMBINING FLAG

SUMMARY: This flag defines which damaged or injured RJs in the game can be combined in fractional quantities. If allowed, fractional quantities up to a whole amount will be combined when in the same state.

The combining process will cause distortion to the times recorded as RJ attributes and for this reason may not be desirable for critical patient types. It is recommended that combining be used wherever possible as it should reduce the shortage and processing costs associated with a potentially large number of entities with small fractional quantities.

DATA USER:	F-TRANSFORM	(F-F3)
	F-RAM/DNBI-INIT	(F-F4)
	F-BATTLE-EFFECT	(F-F5)
PARAMETERS:	RJ-type	
RESPONSE:	Combining-flag	Yes/No

F-CC6 SUPPORT CLEARING STATION

SUMMARY: This table defines the clearing station to which patients will implicitly be recovered.

DATA USER: F-TRANSFORM (F-F3)
F-RAM/DCBI-INIT (F-F4)

PARAMETERS: Unit ID

RESPONSE: Unit ID of support clearing station

F-CC7 RJ REC PRIORITY TABLE

SUMMARY: This table defines the order in which repair jobs requiring recovery will be considered for recovery support. Because recovery can be from either field to unit maintenance (inbound) or from unit maintenance to DS maintenance (outbound), the priority list must specify inbound or outbound in addition to the RJ-Type.

Moving a tank with XYZ damage in from the field may be given a higher priority than moving a tank with XYZ damage from the Bn to the Bde.

DATA USER: F-RECOVERY (F-F6)
F-RECOVERY-SHORT (F-F8)

PARAMETERS: Unit ID

RESPONSE: Prioritized list: RJ-Type with inbound/outbound-flag

F-CC8 RJ RV PRIORITIES

SUMMARY: This defines which RVs can perform recovery for each RJ and the preferred order for their utilization.

DATA USER: F-RECOVERY (F-F6)
F-RECOVERY-SUPPORT (F-F7)

PARAMETERS: RJ-type

RESPONSE: Capable RV-types in the preferred order of their utilization

F-CC9 RECOVERY SUPPORT UNIT RELATIONSHIP

SUMMARY: This is a list of units (with their supported units) used for aggregating recovery capability. For a given support unit, any remaining recovery capability it has is combined with any remaining capability within the supported units. The remaining recovery requirements of the supported units are considered collectively and allocations are made.

DATA USER: F-RECOVERY-SUPPORT (R-F7)

PARAMETERS: None

RESPONSE: A list of unit IDs and their supported unit IDs

F-CC10 RECOVERY SUPPORT RJ PRIORITY TABLE

SUMMARY: This table defines the order in which repair jobs requiring recovery will be considered for supporting unit recovery. It is similar to RJ-Rec-Priority-Table (F-CC7) but is created for prioritization from a support perspective.

DATA USER: F-RECOVERY-SUPPORT (F-F7)

PARAMETERS: Unit ID of support unit

RESPONSE: Prioritized list: RJ-type with inbound/outbound-flag

F-CC11 OPERATIONAL SYSTEMS LIKE RECOVERY TABLE

SUMMARY: This table shows the thresholds for utilization of operational systems for each unit to perform the recovery; the threshold is a percentage of the authorized quantity of each system. If a unit has some quantity of a system available (on hand) over this threshhold amount, that quantity is authorized to perform recovery. If and when this quantity of the system is used for recovery, no check is made against its utilization in its primary mission.

DATA USER: F-RECOVERY-SHORT (F-F8)

PARAMETERS: Unit ID
System-type

RESPONSE: Percent-avail (threshhold of assigned quantity)

F-CC12 OPERATIONAL SYSTEM LIKE RECOVERY UTILIZATION PRIORITY

SUMMARY: This is similar to the RJ-RV-Priority-Table (F-CC8) but addresses the preferred order of which capable, operational vehicles are to be used to perform the recovery of a given failed/damaged system.

DATA USER: F-RECOVERY-SHORT (F-F8)

PARAMETERS: RJ-type

RESPONSE: Prioritized list of capable recovery systems

F-CC13 UNIT PRIORITY ALLOCATION POLICY

SUMMARY: This flag, if true, indicates that any returns directly to units from a repair site will be made based on unit priority (as defined in F-CC17 Return-Allocation-Priority-List)

If false, returns will be proportionally distributed to all supported units based upon each unit's percentage of the system in unit and DS repair/treatment.

DATA USER: F-RTNS-ALLOC

PARAMETERS: Repair site
System/personnel-type

RESPONSE: Flag True/False

F-CC14 RJ EVAC PRIORITY TABLE

SUMMARY: This table defines the order in which repair jobs requiring evacuation will be considered for evacuation support. It is similar to the RJ-Rec-Priority-Table (F-CC7) but is concerned only with evacuation. In addition to specifying RJ types, it should also identify which repair site to consider. This can allow for the very implicit representation of transportation assets arriving in brigade ready for an evacuation mission being utilized to evacuate some RJs from battalion.

DATA USER: F-EVAC-MANAGER (F-F11)

PARAMETERS: Unit ID of repair site where evacuation resources are available

RESPONSE: Combinations of RJ-types and unit IDs

F-CC15 EVAC UTILIZATION PRIORITIES

SUMMARY: This is similar to RJ-RV-Priorities (F-CC7) and Operational-Systems-Like-Recovery-Utilization-Priority (F-CC12) It defines for a repair site for each RJ type which evac system can perform the evacuation and the preferred order for their utilization.

DATA USER: F-EVAC-MANAGER (F-F11)

PARAMETERS: RJ-type

RESPONSE: Capable evac system types in the preferred order of their utilization

F-CC16 REPAIR JOB OWNING UNIT ACCOUNTABILITY TABLE

SUMMARY: This table defines for each repair site whether RJs at that site are still unit accountable or not. If an arriving RJ is unit accountable, it has already been deducted from the OH-Qty but not from the assigned quantity of its owning unit. If the repair site is flagged as not being unit accountable then the RJ-Accountability-Flag should be turned off and the amount proportionally reduced from the assigned quantities of all supported units.

This allows the representation of such policies as unit accountability of personnel of DS while in division level medical channels but not once they are passed into the corps hospital system.

DATA USER: A-EVACUATE-RJ (F-A9)

PARAMETERS: Unit ID of repair site

RESPONSE: Flag: True (accountable)
False (not accountable)

F-CC17 RETURNS ALLOCATION PRIORITY LIST

SUMMARY: This list defines which units will be allocated direct returns from a repair site. If the Unit-Priority-Allocation-Policy flag is true, then the allocations will be made to completely satisfy units in the order in which they are listed. If the flag is false, then all units on the list will receive a proportional share of the returns.

DATA USER: F-RTNS-ALLOC (F-F10)

PARAMETERS: Unit ID of repair site
System/personnel-type

RESPONSE: Prioritized list of units receiving support for the given system/personnel type

G-CC1 DECON REQUEST ASSIGNMENT

SUMMARY: This determines whether a request for decontamination should be forwarded to the next decon control unit or should be placed in the current control unit's request queue.

DATA USER: F-DECISION (G-F1)

PARAMETERS: Decon control unit echelon
Number of requests on current controller queue.

RESPONSE: Two responses are possible:
- 0 = forward request to next controller
- 1 = put the request in the queue

G-CC2 DECON TYPE

SUMMARY: This determines what type of decon operation should be used on a contaminated customer.

DATA USER: F-DECISION (G-F1)

PARAMETERS: MOPP Time attacked
Hazard type: Persistent or semipersistent

RESPONSE: One of the following:
- 0 = Hasty
- 1 = Deliberate

G-CC3 DETACH INSTRUCTION

SUMMARY: This determines whether a customer should or should not detach.

DATA USER: F-PREPARE (G-F3)

PARAMETERS: Customer unit ID, Hazard type, Time of attack, Combat status, Customer location

RESPONSE: 0 = Don't detach
1 = Detach

6-CC4 MOVEMENT INSTRUCTION

SUMMARY: This determines the objective location and the type of movement needed by the customer and/or DECON-UNIT to get there. The objective location can be the customer or DECON-UNIT location (the decon site), a designated decon site (if previously selected by the gamer), the DECON-UNIT home location. (If the DECON-UNIT is at the customer location and has finished the decon job, it should either return to its normal location or travel to another customer location. Note that currently no provision is made in the model for the DECON-UNIT to move back to its previously designated home site when it has finished deconning a customer at the customer location and it has no other customer to decon.)

DATA USER: F-PREPARE (6-F3)
F-DONE-DECON (6-F7)

PARAMETERS:

Customer unit ID	Combat status
Decon unit ID	Decon site (optional)
Customer location	Decon unit location:
Job status:	o getting ready to decon
	o done deconning

RESPONSE: Possible objective sites:

- o DECON-UNIT location
- o Customer unit location
- o Gamer designated decon site
- o DECON-UNIT home site

Movement instructions:

0 = Customer moves to objective site
1 = Decon unit moves to the objective site
2 = Both move to objective site

ACRONYMS

ALOC	air lines of communication
ASP	ammunition supply point
ATP	ammunition transfer point
BCOC	base cluster operations center
BL	basic load
BSA	brigade support area
C^3	command, control, and communications
COMMZ	communications zone
CORDIVEM	Corp/Division Evaluation Model
COSCOM	corps support command
CPOC	corps personnel operations center
CSA	corps storage area
CSR	controlled supply rate
CSS	combat service support
CSS MOD II	Combat Service Support Module II
CSSRO	Combat Service Support Representation Objectives
DAO	division ammunition officer
DISCOM	division support command
DMMC	division materiel management center
DNBI	disease nonbattle injury
DODAC	Department of Defense ammunition code
DS	direct support
DSA	division support area
DTO	division tranportation officer
EAC	echelons above corps
EV	evacuation vehicle
EVH	evacuation vehicle hours
EVT	evacuation vehicle type
FASCO	forward area support coordinator
FEBA	forward edge of the battle area
FIFO	first-in first-out
FSB	forward support battalion
GS	general support
HET	heavy equipment transport
JF	job fill
JSD	Jackson System Development
KIA	killed in action
MARC	manpower authorization requirements criteria
MAC	Military Airlift Command
MCA	movement control agency
MCC	movement control center
MCO	movement control officer
MEI	major end item
MHE	material handling equipment
MJSL	Michael Jackson Systems, Ltd.
MLH	medium lift helicopter
MMC	materiel management center

MOPP	mission oriented protective posture
MOS	military occupational specialty
MSR	main supply route
NBC	nuclear, biological, and chemical
NPS	nonplayed systems
OH	on-hand
ORF	operational readiness float
PDS	personnel daily summary
PF	planning factor
PM	preventive maintainance
POL	petroleum, oil, and lubricants
PT	part type
RA	repair action
RH	resource hour
RT	resource type
RAM	reliability, availability, and maintainability
RD	replacement detachment
RDD	required delivery date
REG	repair and evacuation group
RJ	repair job
RO	requisition objective
RRD	replacement regulatory detachment
RSR	required supply rate
RTD	return to duty
RV	recovery vehicle
RVH	recovery vehicle hours
RVT	recovery vehicle type
S&P	stake and platform
S&S	support and service
S&T	supply and transport
SASP	special ammunition supply point
SE	system effectiveness
SP	supply point
SRC	standard requirements codes
SSD	system specification diagram
STON	short ton
TAMCC	theater army materiel management center
TMO	transportation movement officer
TMT	transportation motor transport
TOE	table of organization and equipment
TU	transportation unit
WESS	weapon systems status
WPU	water processing unit
WSM	weapon systems manager
WSRO	weapon system replacement operations

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